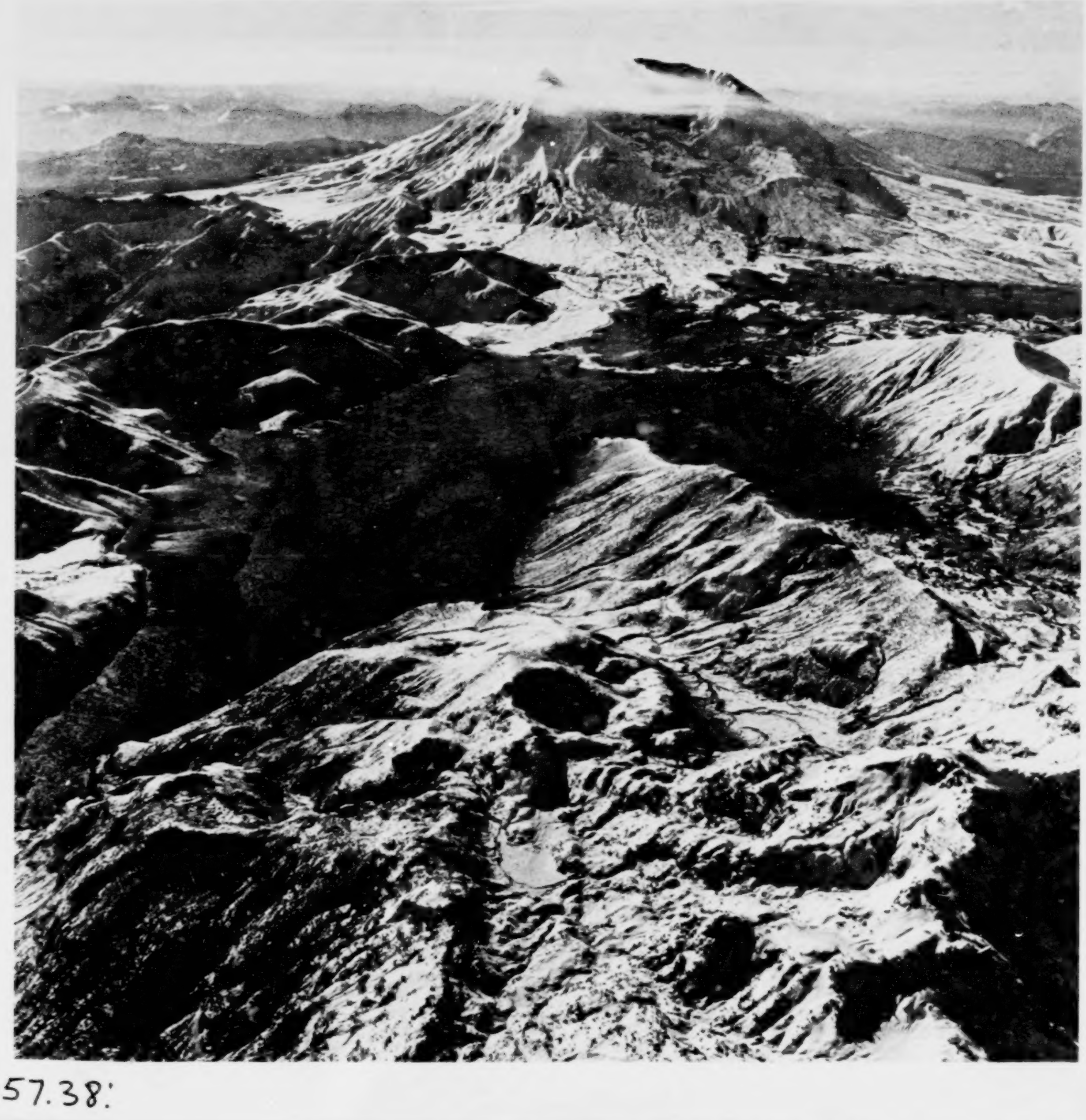
Sk 1/2

United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Washington State
Department of Natural
Resources and
Washington State
University Agriculture
Research Center

Soil Survey of Skamania County Area, Washington



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How To Use This Soil Survey

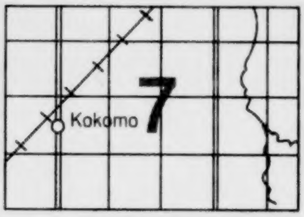
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

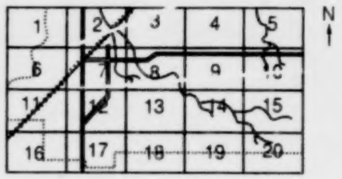
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



MAP SHEET

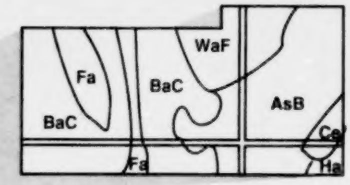
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.

MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for the preeruption part of this soil survey was completed in 1973-79. Soil names and descriptions were approved in 1979. Unless otherwise indicated, statements in detailed map unit descriptions 1 through 173 of this publication refer to conditions in the survey area in 1979, prior to the eruption of Mount St. Helens.

On May 18, 1980, Mount St. Helens, which is in this survey area, erupted violently. Some soils and landscapes near the volcano were completely obliterated or were deeply covered with mudflows, pyroclastic flows, or avalanche debris. Many soils were overblown with volcanic ash and pumice. These soils were remapped, and their new names and descriptions were approved in 1987. Detailed map units 200 through 266, which were assigned these new names, provide descriptions and interpretations for these soils.

Both posteruption and preeruption soil maps are in the back of this survey. The posteruption sheets reflect conditions in 1987. The preeruption sheets show the soils as they were in 1979.

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Cover: Posteruption view of Mount St. Helens; Spirit Lake in center.

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Issued October 1990

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Building site development (posteruption) (table 9b) 328
Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets. Lawns and landscaping.

Sanitary facilities (preeruption) (table 10a) 332
Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.

Sanitary facilities (posteruption) (table 10b) 341
Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.

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Roadfill. Sand. Gravel. Topsoil.

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Water management (posteruption) (table 12b) 370
Limitations for—Pond reservoir areas; Embankments, dikes, and levees; Aquifer-fed excavated ponds. Features affecting—Drainage. Terraces and diversions. Grassed waterways.

Engineering index properties (preeruption) (table 13a) 374
Depth. USDA texture. Classification—Unified, AASHTO. Fragments greater than 3 inches. Percentage passing sieve number—4, 10, 40, 200. Liquid limit. Plasticity index.

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Water features (preeruption) (table 15a) 415
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Water features (posteruption) (table 15b)................................. 420
Hydrologic group. Flooding. High water table.

Soil features (preeruption) (table 16a) 422
Bedrock. Potential frost action. Risk of corrosion.

Soil features (posteruption) (table 16b)................................... 427
Bedrock. Potential frost action. Risk of corrosion.

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Foreword

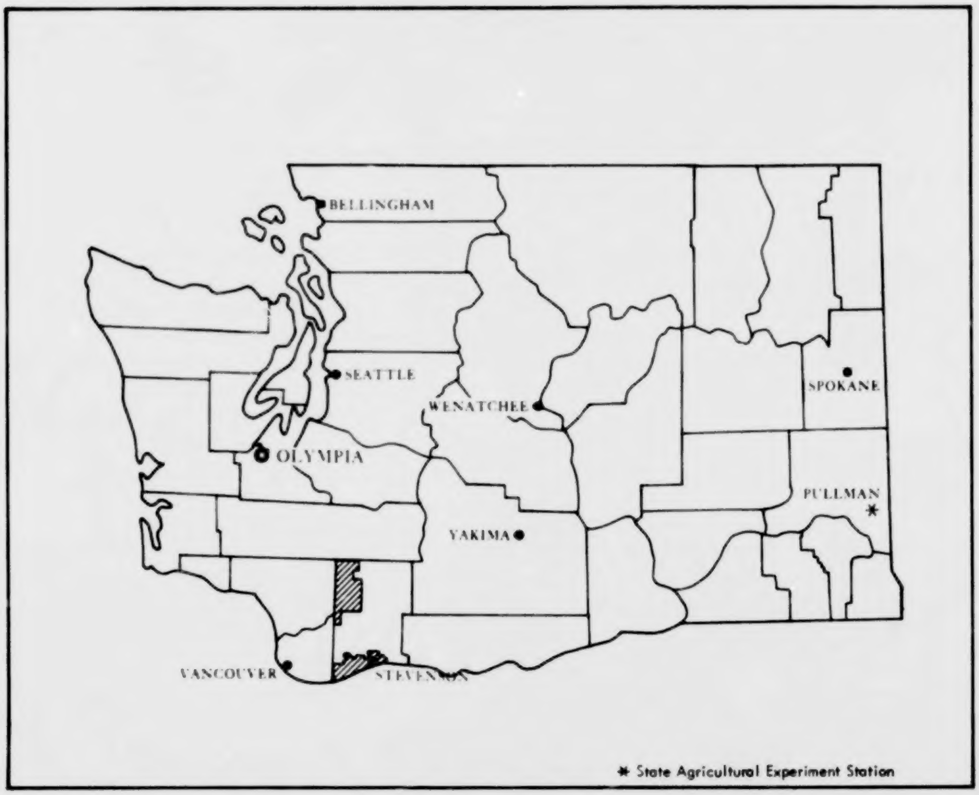
This soil survey contains information that can be used in land-planning programs in Skamania County Area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Lynn A. Brown
State Conservationist
Soil Conservation Service


BELLINGHAM
SEATTLE
WENATCHEE
SPOKANE
OLYMPIA
PULLMAN
YAKIMA
VANCOUVER
STEVENSON
* State Agricultural Experiment Station

Location of Skamania County area in Washington.

Soil Survey of
Skamania County Area, Washington

By Edward Haagen, Soil Conservation Service

Fieldwork by Edward Haagen, Terry L. Aho, Alan Goldin, and Thomas Fait, Soil Conservation Service; and Robert L. Evans, Ronald H. Kurtz, Jeffrey A. Sherwood, and Philip J. Schoeneberger, Washington State Department of Natural Resources

United States Department of Agriculture, Soil Conservation Service
In cooperation with
Washington State Department of Natural Resources and Washington State University
Agriculture Research Center

Skamania County Area is in the southwestern part of Washington. It has an area of 1,070,080 acres, or about 1,672 square miles. Stevenson, the county seat, is in the southeastern part of the survey area, along the Columbia River. The population of Skamania County in 1980 was 7,914, which was essentially the same as that of the survey area. The Gifford Pinchot National Forest was not included in the survey area, except for 187 square miles that has some private land holdings within it.

The survey area is in a region that has high, deeply dissected mountains. The southern part along the Columbia River has some nearly level terraces, but mountains predominate. The west-central part is mainly mountainous and has a few terraces and terrace escarpments. The northern part is mainly mountainous but has foothills forming at the base of Mount St. Helens. Streams generally flow westward. Timber production is the main economic enterprise in the county. Some areas are suited to apple and pear orchards.

Soil scientists determined that there are about 65 different kinds of soil in the survey area. The soils have a wide range in texture, parent material, and other properties.

The present survey updates an earlier survey of Skamania County published in 1956 *(13)* and provides additional information and larger scale maps that show the soils in more detail. This survey is also an update of a part of a soil survey made by the Weyerhaeuser Company in 1971 *(3)*.

The survey area of Skamania County Area borders the survey in Clark County *(17)*. Descriptions and names of soils in this survey do not fully correspond with those listed on soil maps for Clark County. Differences between this survey and older surveys should be expected as more is learned about soils over time and concepts about soils are adjusted to fit new knowledge.

Climate

Climatic data for this section were especially prepared for the Soil Conservation Service by the National Climatic Data Center, Asheville, North Carolina.

The Coast Range shields the survey area from the severe winter storms moving inland from the ocean, and the Cascade Range protects the area from the high summer and low winter temperatures of eastern Washington. The Columbia River Gorge moderates the blocking effect of the Cascade Range somewhat by allowing air exchange between the inland and coastal areas of the state. Winds in the gorge usually blow from west to east in summer and from east to west in winter. Gale force winds through the gorge are common, especially in winter. Severe ice storms, locally called silver thaws, are another phenomenon of the part of the gorge that is west of the Cascade Divide. Precipitation and temperature vary with elevation, proximity to mountainous areas, position on leeward or windward slopes, and the season.

Table 1 gives data on temperature and precipitation at Bonneville, Oregon, and at Wind River and Cougar, Washington, for the period 1951 to 1978. Table 2 shows the probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature at Bonneville, Wind River, and Cougar are 39, 38, and 34 degrees F, respectively. The average daily minimum temperature is 33 to 34 degrees at Bonneville and Cougar and 28 degrees at Wind River. The lowest recorded temperature, which occurred at Wind River on January 26, 1957, was -12 degrees. In summer, the average temperature is 63 degrees at Wind River and Cougar and 65 degrees at Bonneville. The average daily maximum temperature is about 76 degrees. The highest recorded temperature, which occurred at Wind River on July 31, 1971, and at Cougar on July 31, 1965, is 105 degrees.

Growing degree days, shown in table 1, are equivalent to heat units. During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 77 inches at Bonneville, 102 inches at Wind River, and 118 inches at Cougar. Of this, 20 percent usually falls in April through September, which includes the growing season for most crops. The heaviest 1-day rainfall during the period of record was 6.5 inches at Wind River on January 15, 1974. Thunderstorms occur on about 7 days each year, and most occur in summer.

Average seasonal snowfall is 13 inches at Bonneville, 109 inches at Wind River, and 29 inches at Cougar. The greatest snow depth at any one time during the period of record was 80 inches. The number of days with at least 1 inch of snow on the ground is, on the average, 4 days at Bonneville, 18 days at Wind River, and 10 days at Cougar. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The percentage of possible sunshine is 65 in summer and 25 in winter. The prevailing wind is from the northwest. Average windspeed is highest, 10 miles per hour, in winter.

Physiography and Geology

Terry L. Aho, soil scientist, Soil Conservation Service, helped to write this section.

Skamania County Area is in the Cascade Range uplift, a region characterized by deeply dissected mountains. Between Cape Horn and Underwood Mountain, the Columbia River has cut through the Cascade Range to form the Columbia River Gorge, a deep canyon lined by precipitous slopes that have outcrops of basalt and andesite.

Viewed from the higher elevations, the county has the appearance of a deeply dissected, sloping plateau. The physiographic features are rugged mountainous areas, river flood plains, and low terraces. Elevation ranges from near sea level on the Columbia River to about 3,000 feet on the mountain crests in the southern part of the county. In the northern part of the county, elevation ranges from about 1,000 feet at Swift Creek Reservoir to 8,365 feet at Mount St. Helens.

The Cascade Range in Skamania County is of particular interest because it contains the most complete stratigraphic section of Tertiary and Quaternary volcanic rocks in the state. In the Wind River area are extensive deposits of Cenozoic lava and volcanic debris. These rocks are divided into four units: Ohanapecosh Formation, Eagle Creek Formation, Yakima Basalt, and Quaternary basalt flows *(13)*.

The oldest unit, Eocene to early Oligocene in age, is the Ohanapecosh Formation of the Mount Rainier region. It is nearly 19,000 feet thick. The lower two-thirds of this unit is composed mostly of andesitic pyroclastic debris in tuff breccia. The upper 6,000 feet of the formation, which was deposited during the Oligocene Epoch, is composed of about equal amounts of conglomerate and sandstone, tuff, and pyroclastic breccia.

Following folding and uplift, the top of the Ohanapecosh Formation was deeply weathered. Andesitic gravel and sand of the Eagle Creek Formation were then deposited over the Ohanapecosh Formation during the early Miocene. The Eagle Creek Formation was then eroded, and the resulting topography was inundated by Yakima Basalt from the east during the late Miocene. Deposits of the Eagle Creek Formation in the survey area were about 1,300 feet thick. Yakima Basalt flows in the area are as much as 2,000 feet thick. Aschoff, Skoly, and Zygore soils formed in residuum and colluvium derived from these formations.

Gentle folding accompanied by eruptions from several andesitic and basaltic volcanoes took place during the Pliocene. This was followed by erosion that stripped away the lava flows, leaving only scattered plugs of diorite and diabase. Beacon Rock and Wind Mountain are remnants of these plugs. Some granodiorite is exposed in the southwestern part of the survey area. Dougan soils formed in residuum and colluvium derived from these intrusive formations.

Quaternary volcanism has been limited to the extrusion of basalt flows from at least ten different vents. The lavas can be grouped into olivine, platy olivine, and low-alumina basalt. These include flows from the Red Mountain and Trout Creek Hill volcanoes and flows of the Big Lava Bed north of Willard *(7)*. Some of the accompanying volcanic ash and pumice accumulated on terraces in the upper Wind River area. The Stabler soils formed in this material, whereas the Chemawa soils formed in alluvium derived from volcanic ash and basalt.

Local landslides, some taking place as recently as 200 years ago, have occurred in several areas along the Columbia River. The large Bonneville landslide, between the cities of North Bonneville and Stevenson, exposed the Red Bluffs. Steever soils formed in material from this landslide. The landslide, which consists chiefly of the Eagle Creek Formation and Yakima Basalt, blocked the Columbia River for a short period. Another landslide between Wind Mountain and Dog Mountain consists chiefly of material from the Ohanapecosh Formation. This landslide is still active. It moves 40 to 50 feet a year at the upper end of the slide and 5 to 10 feet a year at the toe. A phase of the St. Martin series is mapped in this area.

Mount St. Helens, a volcano of late Quaternary age, is situated near the west margin of the Cascade Range, in the northwestern part of the survey area. The cone consists of lava flows of olivine basalt and pyroxene andesite that surround a summit plug of dacite. Valley fill adjacent to the volcano includes pyroclastic flow material, lahar, and alluvium, which are locally interbedded with tephra and glacial drift *(24)*. Shoestring, Forsyth, Polepatch, and St. Helens soils formed in these materials. Shoestring and St. Helens soils have a mantle of volcanic ash 20 to 35 inches thick, whereas Forsyth and Polepatch soils have little or no mantle of ash.

Mount St. Helens has been an intermittent source of tephra for more than 35,000 years *(25)* (fig. 1). The sequence and thickness of the tephra layers depend on the direction of the prevailing winds at the time of eruption (fig. 2). Tephra layer Y is one of the oldest layers in the upper 60 inches of the soils in northern Skamania County. Layer Y is present in Cattcreek and Tradedollar soils, which are north of Mount St. Helens. Moving clockwise, northeast of Mount St. Helens the thickness of layers T and W increases to more than 60 inches. Minniepeak and Sinnice soils formed in layers T and W, with layer W extending to a depth of more than 60 inches.

East of Mount St. Helens, layer T is absent or very thin and layer W decreases to 15 to 25 inches in thickness. Bandid and Pelee soils formed in this area, with layer W overlying tephra subset B. The decrease in the thickness of tephra layers T and W indicates the major tephra fall was on an axis northeast of Mount St. Helens. Moving further in a clockwise direction, the thickness of tephra layer W decreases rapidly. Southeast of Mount St. Helens, tephra layer W in the Bannel soils is 5 to 6 inches thick over tephra subset B, set P, and, in a few areas, layer Y.

South and southwest of Mount St. Helens, a discrete layer W is absent; however, some pumice of tephra layer W is incorporated into the surface layer of the soils. Cinnamon, Lonestar, and Yalelake soils formed in tephra subset B and set P in this area.

South of the Swift Creek Reservoir and in an area west of Mount St. Helens, the tephra fall is less than 40 inches thick. This has resulted in soils that developed in a mantle of ash and in residuum and colluvium derived from the underlying basalt and andesite. Hatchet, Swift, and Vanson soils formed in these materials.

The general soil map in the back of this survey shows the extent of the area that was affected by the eruption. The map does not cover the entire blast area, because it extends beyond the boundaries of Skamania County. Landscapes that were changed by avalanche debris, mudflow, or pyroclastic flow were remapped and renamed. Some landforms were not changed. These landforms received ash or tephra deposits varying in depth and texture. Descriptions of the affected map units are included. Affected areas are delineated on posteruption soil maps. Soil interpretations based on the deposits are also included in this survey.

Eruption of Mount St. Helens

Mount St. Helens, dormant for 123 years, erupted on March 27, 1980. A small crater formed in the glacial ice near the summit. Minor activity continued through April. The formation of a bulge on the north flank of the mountain was detected late in April. It continued to grow in size until May 18.

On Sunday morning, May 18, 1980, Mount St.

Tephra layer (set)	Age in years	Nature of event
T	190 - 140	Eruptions of dacitic tephra; a dacite dome; andesite lava flows. General direction: northeast.
X W	500 - 450	Eruptions of dacitic and andesitic tephra; dacite domes; andesite lava flows; pyroclastic flows. General direction: north-northeast-east.
	1,150	Eruption of dacite dome; pyroclastic flows.
U I UN L Subset B	2,500 - 1,700	Eruptions of basaltic, andesitic, and dacitic tephra and scoria; basaltic and andesitic lava flows; pyroclastic flows.
P	3,000 - 2,500	Eruption of dacitic tephra; dacite domes; pyroclastic flows.
Y	4,000 - 3,300	Eruptions of dacitic tephra; dacite domes; pyroclastic flows. General directions: north and east.
J/C S	13,000 - 8,300	Eruptions of dacitic tephra; dacite domes; lithic and pumiceous pyroclastic flows; included dormant intervals of few centuries to as much as 3,000 years. Latter part of Fraser Glaciation.
K M	21,000 - 18,000	Eruptions of pumiceous tephra; dacite domes and lava flows; lithic and pumiceous pyroclastic flows; included dormant interval during Fraser Glaciation and alpine glaciers.
C	40,000 - 36,000	Eruption of tephra; pumiceous pyroclastic flows; lahars of lithic material.

Figure 1.—Geologic history of tephra of Mount St. Helens.

Helens erupted with cataclysmic fury. An earthquake of a magnitude of 5 on the Richter scale shook the mountain, causing the bulge on the north side to give way in a giant avalanche of rock, mud, and ice. The avalanche was quickly followed by both vertical and horizontal blasts of superheated gas, ash, and rock fragments. The horizontal blast covered an area 8 miles long and 15 miles wide, killing virtually everything in its path. The lighter material was sent into the atmosphere almost 14 miles straight up, forming a large ash cloud. The winds moved the ash cloud in a northeasterly direction. The ash fell over much of Eastern Washington and parts of Idaho and Montana. The giant avalanche of rock and ice spilled into Spirit Lake and filled the valley of the North Fork of the Toutle River with as much as 200 feet of debris.

Meltwater from snow and glaciers, mixed with volcanic debris, created huge mudflows. These

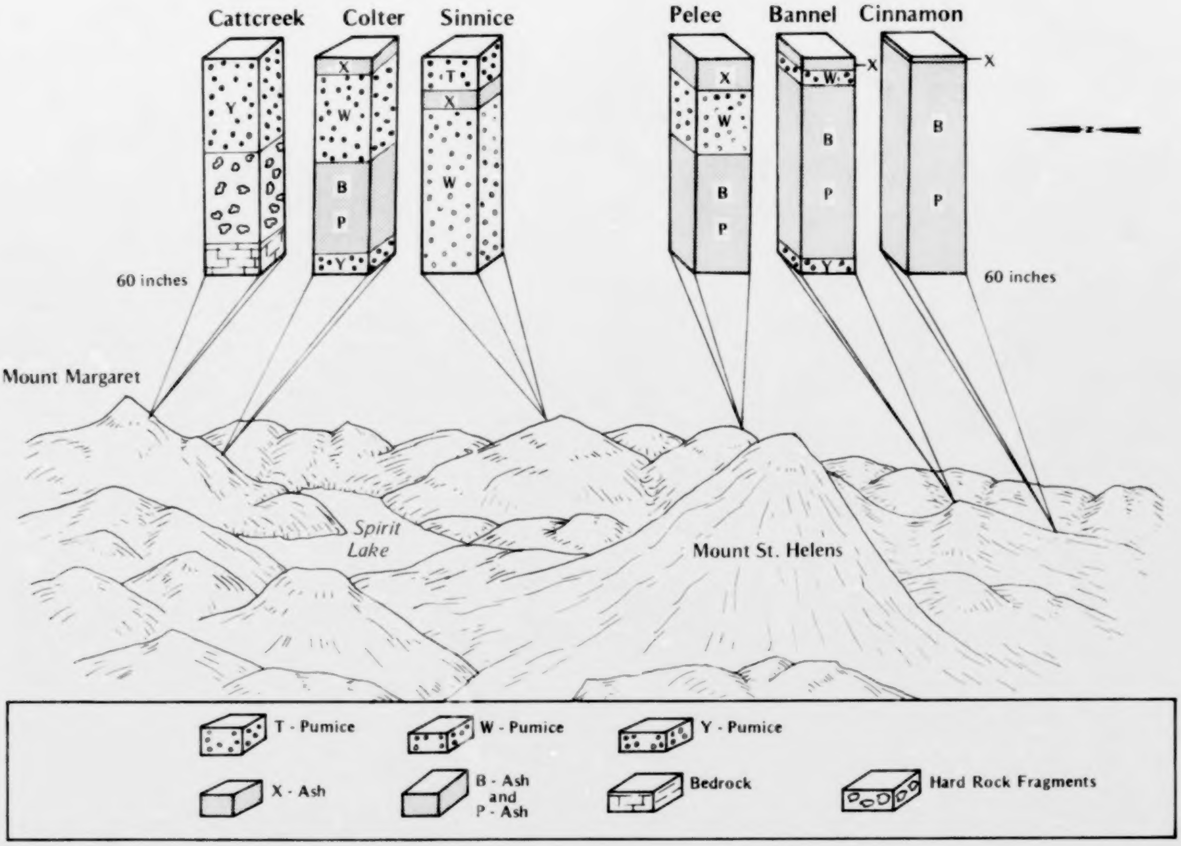

Cattcreek
Colter
Sinnice
Pelee
Bannel
Cinnamon
Y
X
W
B
P
T
60 inches
Mount Margaret
Spirit Lake
Mount St. Helens
T - Pumice
W - Pumice
Y - Pumice
X - Ash
B - Ash and P - Ash
Bedrock
Hard Rock Fragments

Figure 2.—Geographic locations and profiles of soils adjacent to Mount St. Helens.

mudflows swept down the Pine Creek, Muddy River, and Smith Creek, southeast of the mountain, dumping mud and debris in the eastern end of Swift Reservoir.

A huge mudflow in the North and South Forks of the Toutle River swept down the valley carrying with it thousands of logs. The mudflow destroyed logging camps, roads, and bridges in its path and deposited mud and debris into the Cowlitz and Columbia Rivers.

Mount St. Helens erupted again on May 25, this time sending clouds of ash to the southwest and northwest. Portland, Oregon, and Centralia, Washington, reported deposits of ash. Additional eruptions were reported on June 12, July 22, August 7, and October 16 and 17, but they produced only minor amounts of ashfall. Three years after the initial eruption, Mount St. Helens had lapsed into a period of calm interrupted only by an occasional earthquake, along with dome building and venting of steam and minor amounts of ash. During the eruptive period in the 1800's, Mount St. Helens was active for more than 20 years *(13)*.

Deposits from the May 18, 1980, eruption of Mount St. Helens and subsequent eruptions can be separated into two basic groups. The first group is flows, including mudflows, avalanche debris flows, and pyroclastic flows. These flows range from less than 1 foot to several hundred feet in thickness. They are separated on the posteruption soil maps. The second group is aerial deposits of ash and pumice. The aerial deposits are as much as about 30 inches thick.

Of the various flows, the deepest deposit and the

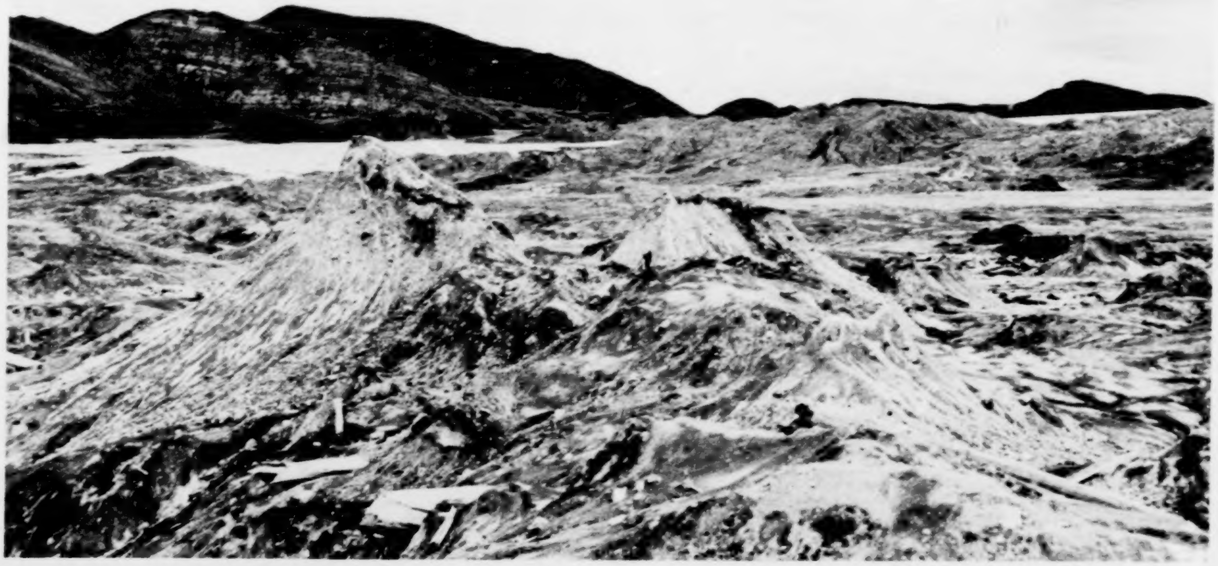


Figure 3.—Avalanche debris flow in an area of Studebaker very gravelly loamy sand, 0 to 20 percent slopes.

most damaging was the May 18 avalanche debris flow, which was triggered by the lateral explosion of the north flank of the mountain. The debris avalanche raced down the north side of Mount St. Helens seconds ahead of the lateral blast. The debris avalanche deposited several hundred feet of debris into the North Fork of the Toutle River and into the western end of Spirit Lake. The resulting displacement wave of water in Spirit Lake, coupled with the force of the lateral blast, partially or completely removed soils on south-facing slopes adjacent to Spirit Lake and on the ridge north of the North Fork of the Toutle River. During the later stages of the May 18 eruption and the later eruptions through the summer of 1980, mudflows and pyroclastic flows streamed over a part of the avalanche debris flow. The Studebaker series was mapped on the avalanche debris flow (fig. 3), and the Panhandle series was mapped on the pyroclastic flow (fig. 4).

Mudflows off the east and southeast flanks of the mountain flowed down the Pine Creek, Muddy River, and over and through Ape Canyon. The mudflows scoured and eroded the soils in narrow passages and deposited several feet of debris in wide flat areas. The mudflows washed out bridges and roads and sent logs and debris into the eastern end of the Swift Reservoir. Minor mudflows, off the southwest flank of Mount St. Helens, covered and washed out logging roads, leaving deposits as much as 3 feet deep. The Obscurity and Wakepish soils were mapped on these mudflows.

Aerial deposits in the survey area are as much as 30 inches thick; however, areas that have less than 4 inches of ash or cinder deposition have not been remapped. Soils that have an ash layer 4 to 20 inches thick are mapped as an overblown phase of the soil series mapped prior to the eruption. Deposits more than 20 inches thick were mapped as the Elkprairie series. Some of these soils are on toe slopes and fans and in bottom land areas, where material from upslope erosion is accumulating. The deepest aerial deposit from the May 18 eruption is 5 to 6 miles north of the volcano and includes debris from the lateral blast. Depth of deposits decreases in all directions from this area. Composition of the aerial deposits varies with direction from the mountain. North and northwest of Mount St. Helens the surface layer is predominantly volcanic ash, while northeast and east the surface layer is extremely cindery. Erosion by water and wind has greatly affected the depth of these deposits; thus, variations in depth may occur over short distances.

A more detailed description of the affected area is provided in the section "Detailed Soil Map Units" and in the soil interpretation tables. Soil descriptions and other data provided in this survey can be used to make additional interpretations.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The soil profiles were examined from the surface to a depth of 5 feet or to bedrock or other consolidated material where at a depth of less than 5 feet.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the areas. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the

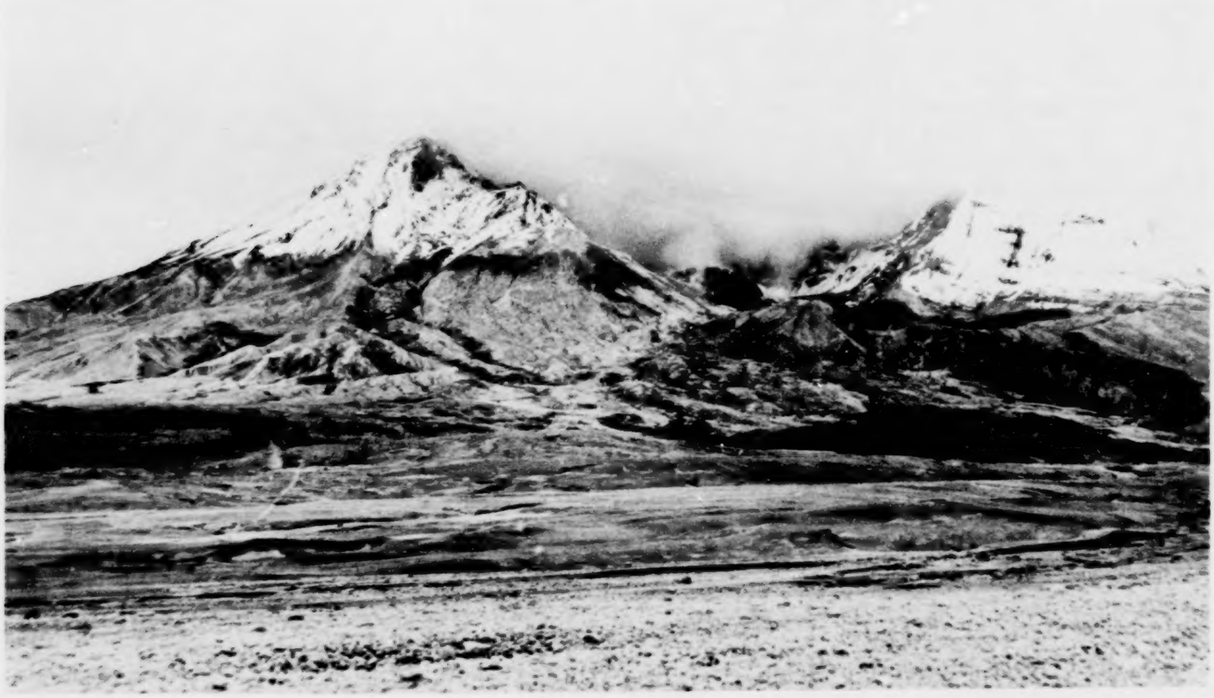


Figure 4.—Pyroclastic flow in an area of Panhandle extremely cindery loamy sand, 0 to 20 percent slopes, on the north side of Mount St. Helens.

kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge gradually into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles they studied. They noted color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey areas and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properites to determine the expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses and under different levels of management. Some interpretations were modified to fit local conditions, and some new interpretations were developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

The fieldwork on this survey was completed in 1979, just prior to the eruption of Mount St. Helens. The eruption altered many landscapes and covered a vast area with pumice and volcanic ash to the point that the area needed to be resurveyed. Observations of the area after the eruption were limited by accessibility. Access to the blast zone was restricted by the hazard of further eruptions. Also, the road system was destroyed by washouts and clogged with fallen trees, which made travel extremely difficult. During the summer of 1981, arrangements were made to fly into the area by helicopter. Aerial photography of the affected area was studied to determine the extent of the changes made to the landscape. Notes and profile descriptions were taken at various locations within the blast area. This information, along with the photo interpretation and information obtained from the U.S. Geological Survey, was used to set up new map units. Landscapes that were completely altered and soils that were covered with more than 20 inches of volcanic ash were renamed and reclassified. Landscapes that were covered with pumice or volcanic ash, or both, 4 to 20 inches thick were correlated as overblown phases of the soil series that had been identified and mapped prior to the eruption.

General Soil Map Units

The general soil map at the back of this publication is in two parts. The first part shows all of the survey area as it was in 1979. The second part shows the northern part of the survey area as it was in 1987, after the eruption of Mount St. Helens. The general soil map shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped into general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages.

General Soil Map Units—Preeruption

Soils on Flood Plains and Terrace Escarpments

This group consists of one map unit. It makes up about 2 percent of the survey area.

1. Skamania-Washougal-Pilchuck

Very deep, well drained and somewhat excessively drained, nearly level to steep soils; on flood plains, terraces, and terrace escarpments

This map unit is in the southwestern part of Skamania County, along the Columbia, Wind, and Little White Salmon Rivers. Slope is 0 to 50 percent. Vegetation is mainly mixed coniferous and hardwood trees with an understory of shrubs and forbs. Elevation is 50 to 800 feet. The average annual precipitation is 60 to 70 inches, the average annual air temperature is about 48 to 50 degrees F, and the average frost-free season is 110 to 200 days.

This unit makes up about 2 percent of the survey area. It is about 35 percent Skamania soils, 30 percent Washougal soils, and 10 percent Pilchuck soils. The remaining 25 percent is components of minor extent.

Skamania soils are on terraces and terrace escarpments. These soils are very deep and well drained. They formed in mixed alluvium derived from basalt, andesite, and volcanic ash. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is very fine sandy loam. The subsoil is very fine sandy loam and fine sandy loam. The substratum to a depth of 60 inches or more is loamy fine sand.

Washougal soils are on terraces and terrace escarpments. These soils are very deep and well drained. They formed in mixed alluvium derived from basalt, andesite, and volcanic ash. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is loam. The underlying material to a depth of 60 inches or more is gravelly loam and very gravelly loam over very gravelly coarse sandy loam and extremely cobbly coarse sand.

Pilchuck soils are on flood plains. These soils are very deep and somewhat excessively drained. They formed in alluvium derived from basic igneous rock. The surface layer is very fine sandy loam. The underlying material to a depth of 46 inches or more is stratified loamy fine sand to fine sand. Strata of fine sandy loam are below a depth of 40 inches.

Of minor extent in this unit are Bonneville, Hood, and Skelida soils.

This unit is used for hay, pasture, homesites, and woodland. In some areas the main limitation is the hazard of flooding.

Soils on Mountain Slopes and Terraces

This group consists of four map units. It makes up about 64 percent of the survey area.

2. Cinnamon-Stabler-Chemawa

Very deep, well drained, nearly level to very steep soils; on terraces, foot slopes, and back slopes of mountains

This map unit is in the southeastern and north-central parts of the survey area and along the Wind River. Slope is 0 to 90 percent. The vegetation is mainly mixed coniferous trees, orchards, pasture, and hay. Elevation is 600 to 2,800 feet. The average annual precipitation is 50 to 125 inches, the average annual air temperature is about 44 to 47 degrees F, and the average frost-free season is 90 to 160 days.

This unit makes up about 13 percent of the survey area. It is about 30 percent Cinnamon soils, 15 percent Stabler soils, and 15 percent Chemawa soils. The remaining 40 percent is components of minor extent.

Cinnamon soils are on terraces, foot slopes, and back slopes of mountains. These soils are very deep and well drained. They formed in pyroclastic flows of volcanic ash and pumice. The surface layer is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is sandy loam. The subsoil is loamy sand. Below this to a depth of 60 inches or more is a buried subsoil of sandy loam.

Stabler soils are on terraces and back slopes of mountains. These soils are very deep and well drained. They formed in pyroclastic flows of volcanic ash and pumice. The surface layer is covered with a mat of decomposing needles, leaves, and twigs. The surface layer and subsoil are loam. The substratum to a depth of 60 inches or more is sandy loam.

Chemawa soils are on terraces, foot slopes, and back slopes of mountains. These soils are very deep and well drained. They formed in pyroclastic flows consisting mostly of volcanic ash. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer and subsoil to a depth of 60 inches or more are loam.

Of minor extent in this unit are Forsyth, Mossyrock, Mountzion, Stevenson, and Underwood soils.

This unit is used as woodland, hayland, pastureland, orchards, and homesites. It has few limitations. Chemewa soils are suited to orchards. Pears and apples are the main crops. Stabler soils are used for pasture. A few areas are used for hay.

3. St. Martin-Steever

Very deep, moderately well drained and well drained, nearly level to very steep soils; on mountain slopes

This map unit is in the south-central part of Skamania County, near the Columbia River. Slope is 2 to 65 percent. The vegetation is mainly mixed coniferous trees, a few hardwood trees, and an understory of shrubs and forbs. Elevation is 50 to 2,000 feet. The average annual precipitation is 55 to 75 inches, the average annual air temperature is about 46 to 48 degrees F, and the average frost-free season is 100 to 160 days.

This unit makes up about 13 percent of the survey area. It is about 30 percent St. Martin soils and 25 percent Steever soils. The remaining 45 percent is components of minor extent.

St. Martin soils are on back slopes, foot slopes, and toe slopes of mountains that have been disturbed by landslides. These soils are very deep and moderately well drained. They formed in colluvium derived from andesite. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is gravelly silty clay loam. The subsoil to a depth of 60 inches or more is clay and silty clay loam.

Steever soils are on back slopes, foot slopes, and toe slopes of mountains. These soils are very deep and well drained. They formed in colluvial landslide material derived from basalt, andesite, and conglomerate. The surface is covered with a mat of decomposing needles, leaves, and twigs. The upper part of the surface layer is stony clay loam, and the lower part is gravelly clay loam. The subsoil is very gravelly clay loam and very gravelly loam. The substratum to a depth of 60 inches or more is very gravelly loam.

Of minor extent in this unit are Aschoff, Mountzion, Skoly, Stabler, Stevenson, and Zygore soils.

This unit is used as woodland, homesites, wildlife habitat, watershed, and recreation areas. A few areas are used as hayland and pastureland.

The soils in this unit are predominantly unstable or potentially unstable if disturbed. They generally are suited to use as woodland. The main limitations are seasonal soil wetness, a hazard of erosion, and the presence of unstable areas. If this unit is used as homesites, the main limitations are steepness of slope, wetness, high shrink-swell potential, and potential for landslides.

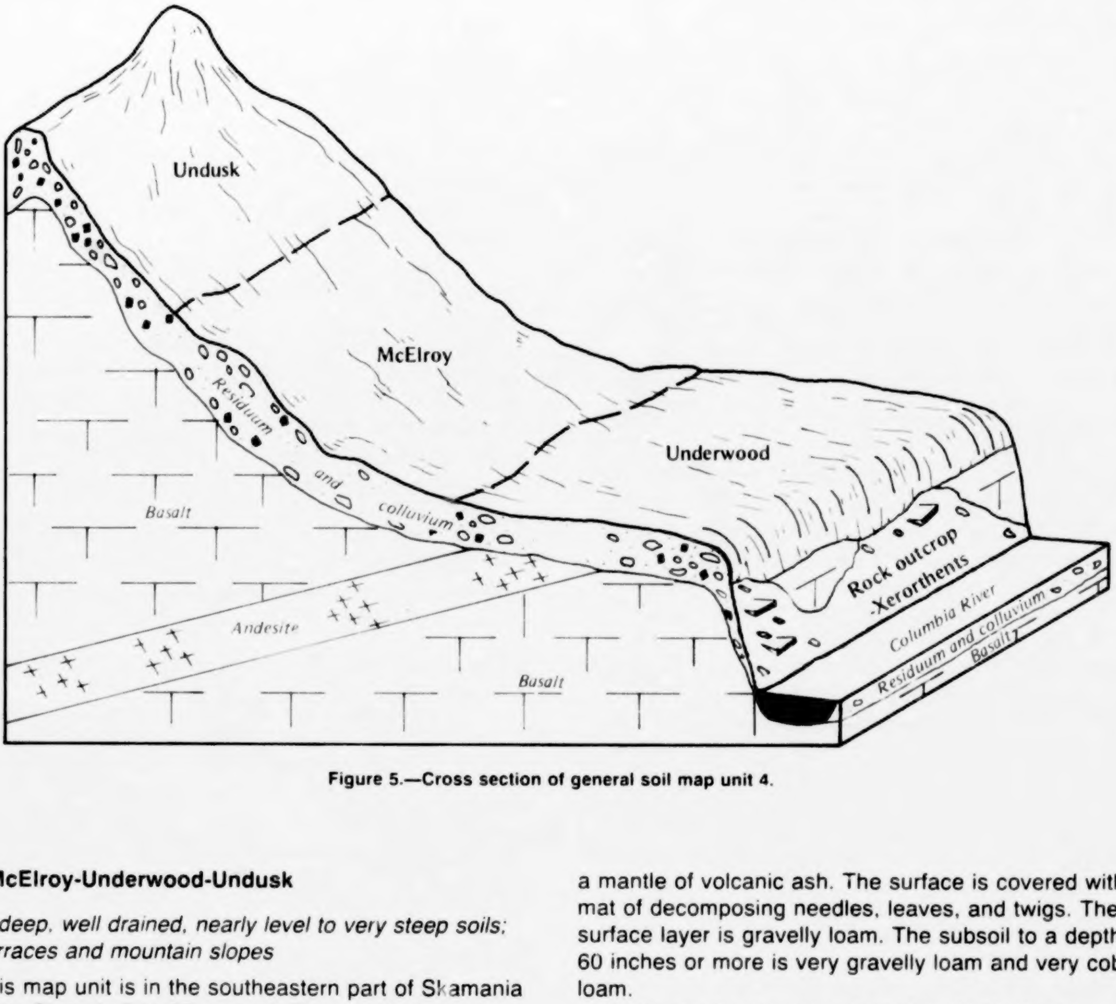


Figure 5.—Cross section of general soil map unit 4.

4. McElroy-Underwood-Undusk

Very deep, well drained, nearly level to very steep soils; on terraces and mountain slopes

This map unit is in the southeastern part of Skamania County. Slope is 2 to 65 percent. The vegetation is mainly mixed coniferous and hardwood trees with an understory of shrubs and forbs. Elevation is 400 to 2,800 feet. The average annual precipitation is about 50 to 55 inches, the average annual air temperature is about 44 to 46 degrees F, and the average frost-free season is 90 to 150 days.

This unit makes up about 11 percent of the survey area. It is about 30 percent McElroy soils, 15 percent Underwood soils, 15 percent Undusk soils, and 40 percent components of minor extent (fig. 5).

McElroy soils are on back slopes and foot slopes of mountains. These soils are very deep and well drained. They formed in colluvium derived from basalt and have a mantle of volcanic ash. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is gravelly loam. The subsoil to a depth of 60 inches or more is very gravelly loam and very cobbly loam.

Underwood soils are on benches, back slopes, and foot slopes of mountains. These soils are very deep and well drained. They formed in residuum and colluvium derived from basalt and andesite and have a thin mantle of volcanic ash. The surface is covered with a mat of decomposing leaves, needles, and twigs. The surface layer is loam. The subsoil is clay loam and loam. The substratum to a depth of 60 inches or more is loam.

Undusk soils are on back slopes of mountains. These soils are very deep and well drained. They formed in colluvium derived from basalt and have a mantle of volcanic ash. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is gravelly loam. The subsoil to a depth of 60 inches or more is very gravelly loam and extremely gravelly loam.

Of minor extent in this unit are Chemawa and Timberhead soils.

This unit is used as woodland, watershed, wildlife habitat, and grazable woodland. Also, a few areas are used for orchards and as homesites and recreation areas.

This unit is suited to use as woodland. The main limitations are steepness of slope and seasonal soil wetness. Underwood soils are suited to orchards in areas adjacent to the Chemawa soils. McElroy and Underwood soils generally are suited to use as homesites. The main limitation is steepness of slope.

5. Zygore-Aschoff-Swift

Very deep, well drained, nearly level to very steep soils; on mountain slopes

This map unit is in the southwestern part of Skamania County, south of Swift Creek Reservoir. Slope is 2 to 90 percent. The vegetation is mainly coniferous trees with an understory of shrubs and forbs. Elevation is 400 to 3,000 feet. The average annual precipitation is 85 to 115 inches, the average annual air temperature is about 43 to 47 degrees F, and the average frost-free season is 90 to 120 days.

This unit makes up about 27 percent of the survey area. It is about 25 percent Zygore soils, 20 percent Aschoff soils, and 20 percent Swift soils. The remaining 35 percent is components of minor extent.

Zygore soils are on foot slopes and back slopes of mountains. These soils are very deep and well drained. They formed in colluvium derived from basalt and andesite mixed with volcanic ash. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is very gravelly loam. The subsoil is very gravelly loam and very gravelly silt loam. The substratum to a depth of 60 inches or more is extremely gravelly silt loam.

Aschoff soils are on foot slopes and back slopes of mountains. These soils are very deep and well drained. They formed in residuum and colluvium derived from basalt and andesite mixed with volcanic ash. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is very gravelly loam. The subsoil is very gravelly loam and very cobbly loam. The substratum to a depth of 60 inches or more is very gravelly loam.

Swift soils are on the side slopes and ridgetops of mountains. These soils are very deep and well drained. They formed in colluvium derived from volcanic ash and basic igneous rock with a mantle of volcanic ash and cinders. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is cindery sandy loam. The subsoil is very cindery loam. Below this to a depth of 60 inches or more is a buried subsoil that is extremely cobbly loam.

Of minor extent in this unit are Dougan, Hesson, Kinney, Mountzion, and Zymer soils and areas of Rock outcrop.

This unit is used mainly as woodland, wildlife habitat, and recreation areas. A few areas are used as homesites.

This unit is suited to timber production, except for a few areas at higher elevations. The main limitations are seasonal soil wetness and steepness of slope. A limitation for reforestation of burned areas is brush encroachment. If this unit is used as homesites, the main limitation is slope in the steeper areas.

Soils on Lava Flows, Mountain Slopes, Escarpments, Terraces, Alluvial Fans, and Terrace Escarpments

This group consists of three map units. It makes up about 34 percent of the survey area.

6. Rock Outcrop-Rubble Land-Lithic Umbric Vitrandepts

Very shallow and shallow, well drained, nearly level to very steep soils; on mountain slopes, escarpments, and lava flows

This map unit is in the north-central part of Skamania County, on and near Mount St. Helens. Slope is 0 to 120 percent. Areas of Rock outcrop and Rubble land generally are barren. Vegetation on the Lithic Umbric Vitrandepts is mixed coniferous trees with an understory of shrubs and forbs. Elevation is 800 to 9,671 feet, on Mount St. Helens. The average annual precipitation is about 130 inches, the average annual air temperature is 35 to 48 degrees F, and the frost-free season is 80 to 115 days.

This unit makes up about 14 percent of the survey area. It is about 40 percent Rock outcrop, 10 percent Rubble land, and 10 percent Lithic Umbric Vitrandepts. The remaining 40 percent is components of minor extent.

Rock outcrop and Rubble land are on mountain slopes and escarpments, mainly on Mount St. Helens. These areas are mainly rock outcroppings, lava flows, and snow and ice fields. Rock outcrop consists of areas in which more than 90 percent of the surface is exposed bedrock. Rubble land consists of areas in which more than 90 percent of the surface is rock fragments. Elevation is 4,000 to 9,671 feet.

Lithic Umbric Vitrandepts are on valley bottoms in areas of lava flows. These soils are very shallow and shallow and are well drained. They formed in volcanic ash and pumice over lava flows of andesite. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer to a depth of 6 inches is sandy loam over very cindery loamy sand. Depth to bedrock ranges from 5 to 15 inches. Elevation is 800 to 4,000 feet.

Of minor extent in this unit are Polepatch soils, Shoestring soils, and Badland.

This unit is used as recreation areas, wildlife habitat, and watershed. The main recreational use is as geological sites. The main interests on the Lithic Umbric Vitrandepts are the lava casts of trees and lava tubes. Climbing perennial snowfields and glaciers are the main recreational uses of the Rock outcrop and Rubble land.

7. Polepatch-Shoestring

Very deep, well drained and somewhat excessively drained, nearly level to very steep soils; on terraces, alluvial fans, and terrace escarpments

This map unit is in the north-central part of Skamania County, near Mount St. Helens. Slope is 0 to 90 percent. The vegetation is mainly mixed coniferous trees with an understory of shrubs and forbs. Elevation is 2,700 to 4,600 feet. The average annual precipitation is 130 to 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free season is 70 to 90 days.

This unit makes up about 6 percent of the survey area. It is about 30 percent Polepatch soils and 30 percent Shoestring soils. The remaining 40 percent is components of minor extent.

Polepatch soils are on alluvial fans and terraces. These soils are very deep and somewhat excessively drained. They formed in lahar with a thin layer of volcanic ash. The surface is covered with a mat of organic matter. The surface layer is extremely bouldery loamy sand. The underlying material to a depth of 60 inches or more is extremely cobbly sand, fine sandy loam, and extremely stony coarse sand.

Shoestring soils are on terraces and terrace escarpments. These soils are very deep and well drained. They formed in aerially deposited volcanic ash and pumice over pyroclastic flow material and lahar. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer is fine sandy loam. The subsoil is very gravelly sand, sandy loam, and loamy sand. The substratum to a depth of 60 inches or more is very cobbly sand and very gravelly sand.

Of minor extent in this unit are Cinnamon, Pinchot, and St. Helens soils and Badland.

This unit is used as woodland, recreation areas, wildlife habitat, and watershed. If this unit is used as woodland, the main limitations are winter snowpack and steepness of slope. Also, boulders on the surface and low available water capacity are limitations on the Polepatch soils.

8. Vanson-Sinnice-Tradedollar

Very deep and deep, well drained, nearly level to very steep soils; on mountain slopes

This map unit is in the northeastern part of Skamania County. Slope is 0 to 90 percent. The vegetation is mainly mixed coniferous trees with an understory of shrubs and forbs. Elevation is 2,800 to 5,400 feet. The average annual precipitation is 90 to 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 75 to 95 days.

This unit makes up about 14 percent of the survey area. It is about 25 percent Vanson soils, 25 percent Sinnice soils, and 20 percent Tradedollar soils. The remaining 30 percent is components of minor extent.

Vanson soils are on foot slopes, back slopes, and ridgetops of mountains. These soils are deep and well drained. They formed in colluvium derived from andesite with a mantle of volcanic ash and pumice. The surface layer, where mixed, is sandy loam. The subsoil is sandy loam, loamy sand, and very gravelly sandy loam. Bedrock is at a depth of 45 inches. Depth to bedrock ranges from 40 to 60 inches.

Sinnice soils are on foot slopes, back slopes, and ridgetops of mountains. These soils are very deep and well drained. They formed in aerially deposited layers of volcanic ash and pumice. The surface is covered with a mat of decomposing needles, leaves, and twigs. The surface layer, where mixed, is extremely cindery loamy sand. The subsoil is fine sandy loam and loamy sand. The substratum to a depth of 60 inches or more is extremely cindery sand.

Tradedollar soils are on back slopes and ridgetops of mountains. These soils are very deep and well drained. They formed in aerially deposited volcanic ash and pumice. The surface is covered with a mat of organic material. The surface layer is sandy loam. The subsoil is cindery sandy loam and extremely cindery loamy sand. Below this to a depth of 60 inches or more is a buried surface layer of cindery sandy loam over a buried subsoil of very gravelly sandy loam.

Of minor extent in this unit are Colter, Cattcreek, Hatchet, and Pelee soils.

This unit is used as woodland, recreation areas, wildlife habitat, and watershed. If this unit is used as woodland, the main limitations are winter snowpack, seedling mortality, and steepness of slope.

General Soil Map Units—Posteruption

Soils on Mudflows

This group consists of one map unit. It makes up about 23 percent of the posteruption area and about 4 percent of the total survey area.

9. Wakepish-Obscurity

Very deep, somewhat excessively drained, nearly level to moderately steep soils; on broad fans and low terraces

This map unit is on the west-, north-, and east-facing slopes of Mount St. Helens. Slope is 0 to 30 percent. Vegetation is absent. Elevation is 1,600 to 5,500 feet. The average annual precipitation is 130 to 135 inches, the average annual air temperature is 40 to 42 degrees F, and the average frost-free season is 70 to 110 days.

This unit makes up about 23 percent of the posteruption area and about 4 percent of the total survey area. It is about 43 percent Wakepish soils and 30 percent Obscurity soils. The remaining 27 percent is components of minor extent.

Wakepish soils are on fans and low terraces along drainageways. These soils are very deep and somewhat excessively drained. They formed in mudflow material. The surface layer is very gravelly sandy loam. The underlying material is very gravelly loamy sand.

Obscurity soils are on broad fans and low terraces. These soils are very deep and somewhat excessively drained. They formed in mudflow material. The surface layer is very bouldery sand. The underlying material is very cobbly loamy sand.

Of minor extent in this unit are areas of Rock outcrop, Rubble land, and Panhandle and Studebaker soils.

This unit has potential for use as recreation areas and wildlife habitat.

Soils on Cindery Pyroclastic Flows

This group consists of one map unit. It makes up about 4 percent of the posteruption area and less than 1 percent of the total survey area.

10. Panhandle

Very deep, well drained, nearly level to strongly sloping soils; on broad fans

This map unit is on the north side of Mount St. Helens. Slope is 0 to 20 percent. Vegetation is absent. Elevation is 2,900 to 5,000 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free season is 75 to 90 days.

This unit makes up about 4 percent of the posteruption area and less than 1 percent of the total survey area. It is about 70 percent Panhandle soils. The remaining 30 percent is components of minor extent.

Panhandle soils are on broad fans. These soils are very deep and well drained. They formed in cindery pyroclastic flow. The surface layer is extremely cindery loamy sand. The underlying material is very cindery loamy sand.

Of minor extent in this unit are Studebaker, Tradedollar, and Vanson soils.

This unit has potential for use as recreation areas and wildlife habitat.

Soils on Avalanche Debris Flows

This group consists of one map unit. It makes up about 18 percent of the posteruption area and about 3 percent of the total survey area.

11. Studebaker

Very deep, somewhat excessively drained, nearly level to strongly sloping soils; in areas of valley fill

This map unit is on the north side of Mount St. Helens. Slope is 0 to 20 percent. Vegetation is absent. Elevation is 2,700 to 5,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free season is 70 to 90 days.

This unit makes up about 18 percent of the posteruption area and about 3 percent of the total survey area. It is about 76 percent Studebaker soils. The remaining 24 percent is components of minor extent.

Studebaker soils are on foot slopes and toe slopes in highly irregular, dissected areas of valley fill. These soils are very deep and somewhat excessively drained. They formed in avalanche debris flow material. The profile to a depth of 60 inches or more is very gravelly loamy sand.

Of minor extent in this unit are Panhandle, Vanson, and Tradedollar soils and Rock outcrop.

This unit has potential for use as woodland and wildlife habitat.

Soils Overblown by Ash

This group consists of two map units. It makes up about 23 percent of the posteruption area and about 4 percent of the total survey area.

12. Vanson-Tradedollar

Ash overblown, very deep, well drained, nearly level to very steep, cryic soils; on mountain slopes

This map unit is on the north side of Mount St. Helens. Slope is 0 to 90 percent. Vegetation is absent. Elevation is 2,800 to 5,400 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 38 degrees F, and the average frost-free season is 75 to 95 days.

This unit makes up about 22 percent of the posteruption area and about 4 percent of the total survey area. It is about 42 percent Vanson soils and 36 percent Tradedollar soils. The remaining 22 percent is components of minor extent.

Vanson soils are on back slopes, foot slopes, and ridgetops of mountains. These soils are very deep and well drained. They formed in residuum and colluvium derived from igneous rock and have a mantle of volcanic ash and pumice. The surface layer is overblown with loamy sand ashfall. The buried surface layer is sandy loam. The upper part of the subsoil is cindery sandy loam, the middle part is loamy sand, and the lower part to a depth of 60 inches or more is sandy loam.

Tradedollar soils are on back slopes and ridgetops of mountains. These soils are very deep and well drained. They formed in aerially deposited volcanic ash and pumice. The surface layer is overblown with loamy sand ashfall. The buried surface layer is sandy loam. The upper part of the subsoil is cindery sandy loam, and the lower part to a depth of 60 inches or more is extremely cindery loamy sand.

Of minor extent in this unit are Vanson, Tradedollar, Wakepish, Studebaker, and Sinnice soils.

This unit has potential for use as woodland, wildlife habitat, and recreation areas.

13. Swift-Cinnamon

Ash overblown, very deep, well drained, nearly level to very steep soils; on mountain slopes

This map unit is in the northern part of Skamania County. Slope is 2 to 90 percent. Vegetation is absent. Elevation is 1,200 to 2,800 feet. The average annual precipitation is 115 to 125 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is 90 to 120 days.

This unit makes up about 1 percent of the posteruption area and less that 1 percent of the total survey area. It is about 43 percent Swift soils and 29 percent Cinnamon soils. The remaining 27 percent is components of minor extent.

Swift soils are on side slopes and ridgetops of mountains. These soils are very deep and well drained. They formed in colluvium derived from volcanic ash and basic igneous rock and have a mantle of ash and cinders. The surface layer is overblown with loamy sand ashfall. The buried surface layer is cindery sandy loam. The upper part of the subsoil is very cindery loam, and the lower part to a depth of 60 inches or more is extremely cobbly loam.

Cinnamon soils are on terraces, foot slopes, and back slopes of mountains. These soils are very deep and well drained. They formed in volcanic ash and pumice. The surface layer is overblown with loamy sand ashfall. The buried surface layer is sandy loam. The subsoil is loamy sand. Below this to a depth of 60 inches or more is sandy loam.

Of minor extent in this unit are Vanson, Tradedollar, and Bandid soils.

This unit has potential for use as woodland, recreation areas, and wildlife habitat.

Soils Overblown by Cinders

This group consists of two map units. It makes up about 32 percent of the posteruption area and about 5 percent of the total survey area.

14. Sinnice

Cinder overblown, very deep, well drained, gently sloping to very steep soils; on foot slopes, back slopes, and ridgetops of mountains

This map unit is in the northeastern part of Skamania County. Slope is 5 to 90 percent. Vegetation is absent. Elevation is 2,800 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 75 to 90 days.

This unit makes up about 24 percent of the posteruption area and about 4 percent of the total survey area. It is about 77 percent Sinnice soils. The remaining 23 percent is components of minor extent.

Sinnice soils are on foot slopes, back slopes, and ridgetops of mountains. These soils are very deep and well drained. They formed in aerially deposited layers of volcanic ash and pumice. The surface layer is overblown with extremely cindery loamy sand and gravelly sand cinderfall. The buried surface layer is extremely cindery loamy sand. The upper part of the subsoil is fine sandy loam, and the lower part is loamy sand. The substratum to a depth of 60 inches or more is extremely cindery sand.

Of minor extent in this unit are Bandid, Vanson, Tradedollar, and Studebaker soils.

This unit has potential for use as woodland, recreation areas, and wildlife habitat.

15. Bandid

Cinder overblown, very deep, well drained, gently sloping to very steep soils; on back slopes, foot slopes, and toe slopes of mountains

This map unit is on the east side of Mount St. Helens. Slope is 5 to 90 percent. Vegetation is absent. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free season is 90 to 110 days.

This unit makes up about 8 percent of the posteruption area and about 1 percent of the total survey area. It is about 75 percent Bandid soils. The remaining 25 percent is components of minor extent.

Bandid soils are on back slopes, foot slopes, and toe slopes of mountains. These soils are very deep and well drained. They formed in stratified aerially deposited ash and pumice. The surface layer is overblown with extremely cindery loamy sand and gravelly sand cinderfall. The buried surface layer is cindery sandy loam, fine sandy loam, and loamy sand. The upper part of the subsoil is cindery fine sandy loam, the next part is extremely cindery sand, and the lower part to a depth of 60 inches or more is stratified cindery sandy loam and loamy sand.

Of minor extent in this unit are Sinnice, Wakepish, Obscurity, Swift, and Cinnamon soils.

This unit has potential for use as woodland, recreation areas, and wildlife habitat.

Broad Land Use Considerations

The soils in the Skamania County Area vary widely in their potential for major land uses. About 1 percent of the land in the survey area is used for orchards and as hayland and pastureland. A small acreage is used to grow grain and grapes for wine. These areas are scattered along the major drainageways in the southern part of the area and are in general soil map units 1, 3, and 4. The main soils are those of the Chemawa, Hesson, and Skamania series. The hazard of erosion is the main limitation for crops. Some areas in map unit 1 are subject to flooding. Seasonal soil wetness, a hazard of erosion, and unstable areas are the main limitations in unit 3. Unit 4 has few limitations.

More than 98 percent of the land in the survey area is woodland. Most of the area is owned by timber companies or is publicly owned. Some small privately owned woodlots are along the Columbia River. The soils in the area are well suited to use as woodland; however, soils at an elevation of more than 4,000 feet are subject to cold temperatures and soils along the Columbia River Gorge are subject to cold, strong winds. Productivity is lower in these areas. The major woodland soils are those of the Aschoff, Cinnamon, McElroy, Vanson, and Zygore series. Management practices used in logging and in road construction should be designed to minimize soil erosion and sedimentation of streams. This is most important on steeply sloping soils.

About 1 percent of the land in the survey area is urban or built-up land. Steepness of slope has restricted urban development to areas on terraces and on flood plains along the Columbia River and its tributaries. Soils on the flood plains, such as those of the McBee and Pilchuck series, are subject to flooding. Bonneville and Washougal soils on terraces have poor filter material for septic tank absorption fields. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as the result of seepage from onsite sewage disposal systems.

The potential for recreational use is high, especially around Mount St. Helens. Scenic vistas, points of geologic interest, and alpine lakes make this area ideal for hiking or horseback riding. Small areas are also available for use as campgrounds and picnic areas.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavior divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation to precisely define and locate the soils and miscellaneous areas is needed.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Skamania very fine sandy loam, 8 to 15 percent slopes, is one of several phases in the Skamania series.

Some map units are made up of two or more major soils or miscellaneous areas. These are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Swift-Rock outcrop complex, 30 to 65 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Badland is an example.

Arents and Andic Cryumbrepts are examples of mapping units that are not members of soil series. These units are made up of soils grouped together at a higher level in the classification system. This higher level is used for units that have wide variations in soil properties. Such units appear in the tables in alphabetical order with the soil series, complete with interpretations.

Tables 4a and 4b give the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Detailed Map Unit Descriptions

1—Andic Cryumbrepts, 5 to 65 percent slopes. These deep and very deep, well drained soils are on ridgetops and mountain slopes. They formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly true firs and shrubs. Elevation is 2,800 to 3,500 feet. The average annual precipitation is 100 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 70 to 100 days.

No single profile is typical of Andic Cryumbrepts, but one commonly observed in the survey area has a surface covered with a mat of decomposing needles, leaves, and twigs 1 inch thick. The surface layer is dark brown cobbly loam 17 inches thick. The subsoil is dark brown cobbly and very cobbly loam 22 inches thick. The substratum to a depth of 60 inches or more is brown cobbly loam.

Included in this unit are small areas of Dougan and Zygore soils. Also included are small areas of Rock outcrop, organic soils, and soils that are shallow to bedrock. Included areas make up about 7 percent of the total acreage.

Permeability of these Andic Cryumbrepts is moderate. Available water capacity is moderately high. Effective rooting depth is 40 to 60 inches. Runoff is medium to rapid, and the hazard of water erosion is severe.

This unit is used as woodland, wildlife habitat, recreation areas, and watershed.

Western hemlock, noble fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock. On the basis of a 50-year curve, the mean site index is estimated to be 75 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for noble fir and Pacific silver fir have not been made. Areas of ridgetops that are subject to strong, persistent winds are less productive than the other areas in this unit.

The main limitations for harvesting timber are steepness of slope, snowpack in winter, and the hazard of erosion. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack hinders the use of equipment and limits access in winter. Establishing plant cover in the steeper areas that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Pacific silver fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. Droughtiness of the surface layer reduces seeding survival, especially on south- and southwest-facing slopes. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit.

Among the common forest understory plants are red huckleberry, common beargrass, lupine, western brackenfern, and vine maple.

This map unit is in capability subclass VIe.

2—Arents, 0 to 5 percent slopes. These very deep, well drained to somewhat excessively drained soils are on alluvial river terraces. They formed in alluvium derived dominantly from recent construction. The introduced vegetation is mainly grasses and legumes. Elevation is 60 to 100 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 125 to 135 days.

No single profile of Arents is typical, but one commonly observed in the survey area has a surface layer of dark brown gravelly sandy loam 24 inches thick. The underlying material to a depth of 60 inches or more is stratified gravelly or very gravelly loamy sand. In some areas the surface layer is nongravelly.

Included in this unit are small areas of Bonneville soils on terraces and Pilchuck soils on flood plains. Included areas make up about 5 percent of the total acreage.

Permeability of these Arents is rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for urban development, wildlife habitat, and recreation.

This unit has few limitations for urban development. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Removal of pebbles and cobbles is needed for best results when landscaping, particularly for lawns. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems.

This map unit is in capability subclass IVs.

3—Aschoff very gravelly loam, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 400 to 2,100 feet. The average annual precipitation is about 85 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark brown and very dark grayish brown very gravelly loam 12 inches thick. The upper 21 inches of the subsoil is dark yellowish brown very gravelly loam, and the lower 14 inches is dark yellowish brown very cobbly loam. The substratum is dark yellowish brown very gravelly loam to a depth of 60 inches or more.

Included in this unit are small areas of Mountzion and Skoly soils. Also included are small areas of St. Martin and Steever soils on old landslides, soils that are moderately deep over basalt, and Aschoff soils that have slopes of more than 30 percent. Included areas make up about 20 percent of the total acreage.

Permeability of this Aschoff soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used as woodland, watershed, wildlife habitat, and recreation. Some areas are used as homesites.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 166 for Douglas fir and is estimated to be 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is 125 for Douglas fir and is estimated to be 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 177 cubic feet per acre per year at age 60 and 244 cubic feet for western hemlock at age 50. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads for year-round use require suitable surfacing. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock.

Among the common forest understory plants are vine maple, Pacific dogwood, common snowberry, creambush oceanspray, salal, Oregongrape, false Solomons seal, and western brackenfern.

The main limitation of this unit for use as homesites is steepness of slope. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass IVe.

4—Aschoff very gravelly loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 400 to 2,100 feet. The average annual precipitation is about 85 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark brown and very dark grayish brown very gravelly loam 12 inches thick. The upper 21 inches of the subsoil is dark yellowish brown very gravelly loam, and the lower 14 inches is dark yellowish brown very cobbly loam. The substratum is dark yellowish brown very gravelly loam to a depth of 60 inches or more.

Included in this unit are small areas of Mountzion and Skoly soils. Also included are small areas of St. Martin and Steever soils on old landslides and Zygore and Aschoff soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Aschoff soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, watershed, wildlife habitat, and recreation.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 166 for Douglas fir and is estimated to be 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is 125 for Douglas fir and is estimated to be 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 177 cubic feet per acre per year at age 60 and 244 cubic feet for western hemlock at age 50. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock.

Among the common forest understory plants are vine maple, Pacific dogwood, common snowberry, creambush oceanspray, salal, Oregongrape, false Solomons seal, and western brackenfern.

This map unit is in capability subclass VIIe.

5—Aschoff-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 400 to 2,100 feet. The average annual precipitation is about 85 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 150 days.

This unit is about 55 percent Aschoff very gravelly loam, 30 to 65 percent slopes; 35 percent Rock outcrop; and 10 percent included soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Skoly and Kinney soils. Also included are small areas of Steever soils on landslides, Aschoff soils that have slopes of less than 30 percent or more than 65 percent, and soils that are shallow to bedrock. Included areas make up about 10 percent of the total acreage.

The Aschoff soil is very deep and well drained. It formed in colluvium derived dominantly from basalt and andesite mixed with volcanic ash. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown very gravelly loam 12 inches thick. The upper 21 inches of the subsoil is dark yellowish brown very gravelly loam, and the lower 14 inches is dark yellowish brown very cobbly loam. The substratum to a depth of 60 inches or more is dark yellowish brown very gravelly loam.

Permeability of this Aschoff soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop is dominantly basalt, andesite, and a few areas of dacite. Numerous escarpments are in this unit.

Most areas of this unit are used for woodland, wildlife habitat, recreation, or watershed. A few areas are used as a source of gravel.

Douglas fir and western hemlock are the main woodland species on the Aschoff soil. On the basis of a 100-year site curve, the mean site index is 166 for Douglas fir and is estimated to be 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is 125 for Douglas fir and is estimated to be 110 for western hemlock. The culmination of the mean annual increment (CMAI) is 177 cubic feet per acre per year for Douglas fir at age 60 and 244 cubic feet for western hemlock at age 50. The areas of Rock outcrop make up about 35 percent of this unit and reduce yields accordingly. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitations for harvesting timber are the areas of Rock outcrop and steepness of slope. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding the areas of Rock outcrop forces yarding paths to converge, which increases compaction and erosion of the soil. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. The areas of Rock outcrop limit the even distribution of reforestation. If the canopy is opened, brush invades and can delay the establishment of Douglas fir seedlings and natural reforestation by western hemlock.

Among the common forest understory plants are vine maple, Pacific dogwood, common snowberry, creambush oceanspray, salal, Oregongrape, false Solomons seal, and western brackenfern.

The Aschoff soil is in capability subclass VIIe, and Rock outcrop is in capability subclass VIIIs.

6—Badland. This map unit consists of deep, somewhat excessively drained areas on very steep terrace escarpments adjacent to Pine Creek and the South Fork of the Toutle River. It formed in lahar material. Slope is 65 to 120 percent. It supports no vegetation. Elevation is 1,200 to 4,400 feet. The average annual precipitation is about 125 inches, the average annual air temperature is 39 to 44 degrees F, and the average frost-free season is 75 to 110 days.

No single profile is typical of Badland, but one commonly observed in the survey area is very cobbly sand and extremely gravelly sand to a depth of 60 inches or more.

Included in this unit are areas that have a loamy sand surface layer consisting of ashfall more than 20 inches deep and areas that have slopes of less than 65 percent. Included areas make up about 10 percent of the unit.

Permeability of Badland is very rapid. Available water capacity is low to moderate. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing in the included areas overlain by ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and where waterflow was concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is used for wildlife habitat and esthetic value.

This map unit is in capability subclass VIIIs.

7—Bandid loamy sand, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes and toe slopes of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer, where mixed to a depth of 7 inches, is very dark grayish brown loamy sand. The upper 8 inches of the subsoil is very dark brown loamy sand, and the lower part to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are small areas of Minniepeak, Pelee, and Sinnice soils. Also included are small areas of Bandid soils that have a cindery sandy loam surface layer. Included areas make up about 5 percent of the total acreage.

Permeability of this Bandid soil is moderately rapid in the upper part of the subsoil and very rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 110 for Douglas fir and 113 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for Douglas fir and 80 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 98 cubic feet per acre per year at age 60, and for western hemlock it is 166 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is western redcedar.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are vine maple, Sitka alder, huckleberry, bunchberry dogwood, pearly everlasting, and common fireweed.

This map unit is in capability subclass VIIe.

8—Bandid loamy sand, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown loamy sand 7 inches thick. The upper 8 inches of the subsoil is very dark brown loamy sand, and the lower part to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are small areas of Minniepeak, Pelee, and Sinnice soils. Also included are small areas of Bandid soils that have a cindery sandy loam surface layer and Rock outcrop. Included areas in this unit make up about 8 percent of the total acreage.

Permeability of this Bandid soil is moderately rapid in the upper part of the subsoil and very rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 110 for Douglas fir and 113 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for Douglas fir and 80 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 98 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 166 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar.

The main limitation for harvesting timber is steepness of slope in some areas. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Occasional snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are vine maple, Sitka alder, huckleberry, bunchberry dogwood, pearly everlasting, and common fireweed.

This map unit is in capability subclass VIIe.

9—Bandid cindery sandy loam, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes, toe slopes, and foot slopes of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark grayish brown cindery sandy loam 5 inches thick, and the lower part is brown fine sandy loam and black loamy sand 10 inches thick. The upper part of the subsoil is dark gray extremely cindery sand 12 inches thick, and the lower part to a depth of 60 inches or more is stratified, dark gray cindery sandy loam to black loamy sand.

Included in this unit are small areas of Bannel, Minniepeak, Pelee, and Sinnice soils. Also included are small areas of St. Helens and Yalelake soils on terraces and Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Bandid soil is moderately rapid in the surface layer and is very rapid in the upper part of the subsoil and moderately rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 110 for Douglas fir and 113 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for Douglas fir and 80 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 98 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 166 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is western redcedar.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are vine maple, Sitka alder, huckleberry, bunchberry dogwood, pearly everlasting, and common fireweed.

This map unit is in capability subclass IVe.

10—Bandid cindery sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 100 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark grayish brown cindery sandy loam 5 inches thick, and the lower part is brown fine sandy loam and black loamy sand 10 inches thick. The upper part of the subsoil is dark gray extremely cindery sand 12 inches thick, and the lower part to a depth of 60 inches or more is stratified, dark gray cindery sandy loam to black loamy sand.

Included in this unit are small areas of Bannel, Minniepeak, Pelee, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 5 percent of the total acreage.

Permeability of this Bandid soil is moderately rapid in the surface layer and is very rapid in the upper part of the subsoil and moderately rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 110 for Douglas fir and 113 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for Douglas fir and 80 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 98 cubic feet per acre at age 60, and the CMAI for western hemlock is 166 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is western redcedar.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are vine maple, Sitka alder, huckleberry, bunchberry dogwood, pearly everlasting, and common fireweed.

This map unit is in capability subclass VIIe.

11—Bandid cindery sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark grayish brown cindery sandy loam 5 inches thick, and the lower part is brown fine sandy loam and black loamy sand 10 inches thick. The upper part of the subsoil is dark gray extremely cindery sand 12 inches thick, and the lower part to a depth of 60 inches or more is stratified, dark gray cindery sandy loam to black loamy sand.

Included in this unit are small areas of Bannel, Minniepeak, Pelee, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Bandid soil is moderately rapid in the surface layer, very rapid in the upper part of the subsoil, and moderately rapid in the lower part of the subsoil. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 110 for Douglas fir and 113 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for Douglas fir and 80 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 98 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 166 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is western redcedar.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Occasional snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are vine maple, Sitka alder, huckleberry, bunchberry dogwood, pearly everlasting, and common fireweed.

This map unit is in capability subclass VIIe.

12—Bannel cindery sandy loam, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes and ridges of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,500 to 2,800 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface layer is very dark grayish brown cindery sandy loam 4 inches thick. The upper part of the subsoil is light gray extremely cindery sand 6 inches thick, and the lower part is stratified, dark brown and brown fine sandy loam, cindery fine sandy loam, cindery loamy sand, and cindery loam 40 inches thick. The substratum to a depth of 60 inches or more is brownish yellow extremely cindery sand.

Included in this unit are small areas of Bandid, Cinnamon, and Lonestar soils. Also included are small areas of St. Helens and Yalelake soils on terraces and Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Bannel soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 125 for Douglas fir and 120 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 95 for Douglas fir and 85 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 122 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 180 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are Oregongrape, salal, red huckleberry, princes pine, and willow.

This map unit is in capability subclass IVe.

13—Bannel cindery sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,500 to 2,800 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface layer is very dark grayish brown cindery sandy loam 4 inches thick. The upper part of the subsoil is light gray extremely cindery sand 6 inches thick, and the lower part is stratified, dark brown and brown fine sandy loam, cindery fine sandy loam, cindery loamy sand, and cindery loam 40 inches thick. The substratum to a depth of 60 inches or more is brownish yellow extremely cindery sand.

Included in this unit are small areas of Bandid, Cinnamon, and Lonestar soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Bannel soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 125 for Douglas fir and 120 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 95 for Douglas fir and 85 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 122 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 180 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Trees are occasionally subject to windthrow when winds are strong.

Common forest understory plants are Oregongrape, salal, red huckleberry, princes pine, and willow.

This map unit is in capability subclass VIIe.

14—Bannel cindery sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,500 to 2,800 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 90 to 110 days.

Typically, the surface layer is very dark grayish brown cindery sandy loam 4 inches thick. The upper part of the subsoil is light gray extremely cindery sand 6 inches thick, and the lower part is stratified, dark brown and brown fine sandy loam, cindery fine sandy loam, cindery loamy sand, and cindery loam 40 inches thick. The substratum to a depth of 60 inches or more is brownish yellow extremely cindery sand.

Included in this unit are small areas of Bandid, Cinnamon, and Lonestar soils. Also included are small areas of Yalelake soils on terraces and small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Bannel soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 125 for Douglas fir and 120 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 95 for Douglas fir and 85 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 122 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 180 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are Oregongrape, salal, red huckleberry, princes pine, and willow.

This map unit is in capability subclass VIIe.

15—Benham very cindery sandy loam, 0 to 30 percent slopes. This very deep, well drained soil is on back slopes and foot slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 85 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposing leaves, needles, and twigs 1.5 inches thick. Where mixed to a depth of 6 inches, the surface layer is very dark grayish brown very cindery sandy loam. The upper part of the subsoil is light gray extremely cindery sand 22 inches thick, the next part is mottled, grayish brown sandy loam and fine sandy loam 10 inches thick, and the lower part to a depth of 60 inches or more is grayish brown and strong brown very cindery loamy sand and extremely cindery sand.

Included in this unit are small areas of Colter, Minniepeak, and Sinnice soils. Also included are small areas of Rock outcrop and Benham soils that are 40 to 60 inches deep to bedrock. Included areas make up about 5 percent of the total acreage.

Permeability of this Benham soil is moderately rapid in the middle part of the subsoil and very rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 150 for Douglas fir and 147 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 115 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 158 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 232 cubic feet at age 50. Among the trees of limited extent are red alder, western redcedar, and Pacific silver fir.

The main limitation for harvesting timber is occasional snowpack. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Oregongrape, salal, red huckleberry, western swordfern, and trailing blackberry.

This map unit is in capability subclass IVe.

16—Benham very cindery sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 85 inches, the average annual air temperature is about 4[illegible] degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer, where mixed to a depth of 6 inches, is very dark grayish brown very cindery sandy loam. The upper part of the subsoil is light gray extremely cindery sand 22 inches thick, the next part is mottled, grayish brown sandy loam and fine sandy loam 10 inches thick, and the lower part to a depth of 60 inches or more is grayish brown and strong brown very cindery loamy sand and extremely cindery sand.

Included in this unit are small areas of Colter, Minniepeak, and Sinnice soils. Also included are small areas of Rock outcrop and Benham soils that are 40 to 60 inches deep to bedrock. Included areas make up about 5 percent of the total acreage.

Permeability of this Benham soil is moderately rapid in the middle part of the subsoil and very rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 150 for Douglas fir and 147 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 115 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 158 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 232 cubic feet at age 50. Among the trees of limited extent are red alder, western redcedar, and Pacific silver fir.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer; seedlings that develop in the less fertile subsoil exhibit poor growth and vigor. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Oregongrape, salal, red huckleberry, western swordfern, and trailing blackberry.

This map unit is in capability subclass VIIe.

17—Bonneville stony sandy loam. This very deep, somewhat excessively drained soil is on river terraces. It formed in alluvial sand and gravel derived dominantly from basalt and andesite. Slope is 0 to 5 percent. The native vegetation is mainly mixed conifers, hardwoods, shrubs, and grasses. Elevation is 50 to 400 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 185 to 230 days.

Typically, the upper part of the surface layer is dark brown stony sandy loam about 6 inches thick and the lower part is extremely gravelly coarse sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is dark brown and dark yellowish brown extremely gravelly coarse sand.

Included in this unit are small areas of Pilchuck, Skamania, and Washougal soils. Also included are small areas of Skoly and Steever soils on mountain slopes. Included areas make up about 20 percent of the total acreage.

Permeability of this Bonneville soil is very rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to brief, rare periods of flooding in March through May. Most areas are protected by dams on the Columbia River.

This unit is used for pastureland, homesites, woodland, recreation, and wildlife habitat.

This unit is poorly suited to pasture. The main limitations are large stones and low available water capacity. The use of equipment is limited by stones on the surface. In some years, supplemental irrigation is needed.

The main limitation of this unit for use as homesites is that the soil is a poor filter for septic tank absorption fields. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Selection of adapted vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 90. The culmination of the mean annual increment (CMAI) for Douglas fir is 110 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder have not been made. Strong winds cause breakage of tree limbs and branches and reduce the productivity of this unit. Among the trees of limited extent are bigleaf maple, Oregon white oak, and black cottonwood.

This unit is well suited to year-round logging operations. Rounded pebbles and cobbles for road construction are readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs periodically. Droughtiness of the surface layer reduces seedling survival. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile underlying material exhibit poor growth. Trees occasionally are subject to windthrow. If the canopy is opened, brush invades and can delay the establishment of seedlings unless it is controlled.

Among the common forest understory plants are vine maple, trailing blackberry, western hazel, poison oak, and common snowberry.

This map unit is in capability subclass IVs.

18—Cattcreek very cindery loamy sand, 65 to 90 percent slopes. This deep, well drained soil is on back slopes and in cirque basins of mountains. It formed in pumice and volcanic ash over colluvium derived from andesite. The native vegetation is mainly true firs and shrubs. Elevation is 3,000 to 4,000 feet. The average annual precipitation is about 110 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is dark grayish brown and dark yellowish brown very cindery loamy sand. The upper 9 inches of the subsoil is dark brown very cindery sand, and the lower 15 inches is strong brown extremely cindery sand. The next layer is a buried subsoil of dark yellowish brown extremely gravelly loam 24 inches thick over bedrock. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Colter, Sinnice, and Tradedollar soils. Also included are small areas of Rock outcrop and soils that are less than 40 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Cattcreek soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 124 for western hemlock and 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 86 for western hemlock and 90 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 188 cubic feet per acre per year at age 50, and for Douglas fir it is 110 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir, western redcedar, western white pine, and Alaska cedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, common beargrass, Oregongrape, longtube twinflower, western brackenfern, and bunchberry dogwood.

This map unit is in capability subclass VIIe.

19—Cattcreek very cindery loamy sand, cold, 30 to 65 percent slopes. This deep, well drained soil is on back slopes and in cirque basins of mountains. It formed in pumice and volcanic ash over residuum and colluvium derived from andesite. The native vegetation is mainly true firs and shrubs. Elevation is 4,000 to 5,300 feet. The average annual precipitation is about 110 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is dark grayish brown and dark yellowish brown very cindery loamy sand. The upper 9 inches of the subsoil is dark brown very cindery sand, and the lower 15 inches is strong brown extremely cindery sand. The next layer is a buried subsoil of dark yellowish brown extremely gravelly loam 24 inches thick over bedrock. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Colter, Sinnice, and Tradedollar soils. Also included are small areas of Rock outcrop and Cattcreek soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Cattcreek soil is moderate. Available water capacity is moderately high. Effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Pacific silver fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 84 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 60. The culmination of the mean annual increment (CMAI) for western hemlock is 95 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are Douglas fir, noble fir, western white pine, and Alaska cedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Because the surface layer and subsoil are loose, trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, common beargrass, Oregongrape, longtube twinflower, western brackenfern, and bunchberry dogwood.

This map unit is in capability subclass VIIe.

20—Cattcreek very cindery loamy sand, cold, 65 to 90 percent slopes. This deep, well drained soil is on back slopes and in cirque basins of mountains. It formed in pumice and volcanic ash over colluvium derived from andesite. The native vegetation is mainly true firs and shrubs. Elevation is 4,000 to 5,300 feet. The average annual precipitation is about 110 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is dark grayish brown and dark yellowish brown very cindery loamy sand. The upper 9 inches of the subsoil is dark brown very cindery sand, and the lower 15 inches is strong brown extremely cindery sand. The next layer is a buried subsoil of dark yellowish brown extremely gravelly loam 24 inches thick over bedrock. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Colter, Sinnice, and Tradedollar soils. Also included are small areas of Rock outcrop and soils that are less than 40 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Cattcreek soil is moderate. Available water capacity is moderately high. Effective rooting depth is 48 to 60 inches or more. Runoff is medium, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Pacific silver fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 84 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 60. The culmination of the mean annual increment (CMAI) for western hemlock is 95 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are Douglas fir, noble fir, western white pine, and Alaska cedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are

Sitka alder, common beargrass, Oregongrape, longtube twinflower, western brackenfern, and bunchberry dogwood.

This map unit is in capability subclass VIIe.

21—Chemawa loam, 2 to 8 percent slopes. This very deep, well drained soil is on terraces and foot slopes. It formed in pyroclastic flows consisting mostly of volcanic ash. The vegetation in areas not cultivated is mainly mixed conifers and shrubs. Elevation is 800 to 1,200 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 14 inches thick. The subsoil is dark brown and strong brown loam to a depth of 60 inches or more.

Included in this unit are small areas of McElroy and Underwood soils. Also included are small areas of Chemawa soils that have slopes of more than 8 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Chemawa soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, orchards, hayland, pastureland, homesites, wildlife habitat, and recreation.

Douglas fir and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 150 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 114 for Douglas fir and 105 for grand fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 158 cubic feet per acre per year at age 60, and for grand fir it is 163 cubic feet at age 86. Among the trees of limited extent are red alder and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, common snowberry, false Solomons seal, western brackenfern, and trailing blackberry.

If this unit is used for orchard crops, the main limitation is the hazard of erosion. If the soil is plowed in fall, runoff and erosion can be reduced by seeding to a cover crop.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Mowing at least twice a year helps to maintain uniform growth and discourages selective grazing.

This unit has few limitations as homesites. Population growth has resulted in increased construction of homes on this unit. Preserving the existing plant cover during construction helps to control erosion. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. The soil in this unit is limited for the construction of roads and streets because of the potential for frost action.

This map unit is in capability subclass IIe.

22—Chemawa loam, 8 to 15 percent slopes. This very deep, well drained soil is on foot slopes. It formed in pyroclastic flows consisting mostly of volcanic ash. The vegetation in areas not cultivated is mainly mixed conifers and shrubs. Elevation is 800 to 1,200 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 14 inches thick. The subsoil is dark brown and strong brown loam to a depth of 60 inches or more.

Included in this unit are small areas of McElroy and Underwood soils. Also included are small areas of Chemawa soils that have slopes of less than 8 percent or more than 15 percent. Included areas make up about 12 percent of the total acreage.

Permeability of this Chemawa soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, orchards, hayland, pastureland, homesites, wildlife habitat, and recreation.

Douglas fir and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 143 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 110 for Douglas fir and 105 for grand fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 149 cubic feet per acre per year at age 65, and for grand fir it is 163 cubic feet at age 86. Among the trees of limited extent are red alder and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, common snowberry, false Solomons seal, western brackenfern, and trailing blackberry.

If this unit is used for orchard crops, the main limitation is the hazard of erosion. If the soil is plowed in fall, runoff and erosion can be reduced by seeding to a cover crop.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Mowing at least twice a year helps to maintain uniform growth and discourages selective grazing. In some years, supplemental irrigation is needed.

This unit has few limitations for use as homesites. Population growth has resulted in increased construction of homes on this unit. The main limitations are steepness of slope and the hazard of erosion in the steeper areas. Only that part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. The soil in this unit is susceptible to frost action, which may limit construction of roads and streets.

This map unit is in capability subclass IIIe.

23—Chemawa loam, 15 to 30 percent slopes. This very deep, well drained soil is on foot slopes and back slopes. It formed in pyroclastic flows consisting mostly of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,200 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 14 inches thick. The subsoil to a depth of 60 inches or more is dark brown and strong brown loam.

Included in this unit are small areas of McElroy, Underwood, and Undusk soils. Also included are small areas of Chemawa soils that have slopes of less than 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Chemawa soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, orchards, hayland, pastureland, homesites, wildlife habitat, and recreation.

Douglas fir and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 136 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 104 for Douglas fir and 105 for grand fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 139 cubic feet per acre per year at age 70, and for grand fir it is 163 cubic feet at age 86. Among the trees of limited extent are red alder and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery, and they can be impassable when wet. Logging roads for year-round use need to be surfaced. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, common snowberry, false Solomons seal, western brackenfern, and trailing blackberry.

If this unit is used for orchard crops, the main limitation is the hazard of erosion. If the soil is plowed in fall, runoff and erosion can be reduced by seeding to a cover crop.

This unit is well suited to use as hayland and pastureland. The main limitations are steepness of slope and the hazard of erosion. Erosion can be controlled by growing pasture. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing at least twice a year helps to maintain uniform growth and discourages selective grazing.

The main limitations of this unit for use as homesites are steepness of slope and the hazard of erosion in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. The soil in this unit is susceptible to frost action, which may limit construction of roads and streets.

This map unit is in capability subclass IVe.

24—Chemawa loam, 30 to 50 percent slopes. This very deep, well drained soil is on back slopes. It formed in pyroclastic flows consisting mostly of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,200 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 14 inches thick. The subsoil to a depth of 60 inches or more is dark brown and strong brown loam.

Included in this unit are small areas of McElroy, Underwood, and Undusk soils. Also included are small areas of Chemawa soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Chemawa soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, and recreation.

Douglas fir and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 136 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 104 for Douglas fir and 105 for grand fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 139 cubic feet per acre per year at age 70, and for grand fir it is 163 cubic feet at age 86. Among the trees of limited extent are red alder and bigleaf maple.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, common snowberry, false Solomons seal, western brackenfern, and trailing blackberry.

This map unit is in capability subclass VIIe.

25—Cinnamon sandy loam, 2 to 30 percent slopes. This very deep, well drained soil is on terraces, foot slopes, and back slopes of mountains. It formed in pyroclastic flows of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,600 to 2,800 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown sandy loam 3 inches thick. The subsoil is dark yellowish brown and dark brown loamy sand 19 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of dark yellowish brown sandy loam.

Included in this unit are small areas of Lonestar, Swift, and Vanson soils. Also included are small areas of St. Helens and Yalelake soils on terraces. Included areas make up about 10 percent of the total acreage.

Permeability of this Cinnamon soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 145 for Douglas fir and 133 for western hemlock. On the basis of a 50-year site curve, the mean site index is 106 for Douglas fir and 96 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 152 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 205 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is occasional snowpack. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically.

Among the common forest understory plants are salal, Oregongrape, red huckleberry, thimbleberry, vine maple, willow, and western brackenfern.

This map unit is in capability subclass IVe.

26—Cinnamon sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in pyroclastic flows of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,600 to 2,800 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown sandy loam 3 inches thick. The subsoil is dark yellowish brown and dark brown loamy sand 19 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of dark yellowish brown sandy loam.

Included in this unit are small areas of Lonestar, Swift, and Vanson soils. Also included are small areas of Yalelake soils on terraces. Included areas make up about 8 percent of the total acreage.

Permeability of this Cinnamon soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 145 for Douglas fir and 133 for western hemlock. On the basis of a 50-year site curve, the mean site index is 106 for Douglas fir and 96 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 152 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 205 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically.

Among the common forest understory plants are salal, Oregongrape, red huckleberry, thimbleberry, vine maple, willow, and western brackenfern.

This map unit is in capability subclass VIIe.

27—Cinnamon sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in pyroclastic flows of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,600 to 2,800 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown sandy loam 3 inches thick. The subsoil is dark yellowish brown and dark brown loamy sand 19 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of dark yellowish brown sandy loam.

Included in this unit are small areas of Lonestar, Swift, and Vanson soils. Also included are small areas of Yalelake soils on terrace escarpments. Included areas make up about 10 percent of the total acreage.

Permeability of this Cinnamon soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 145 for Douglas fir and 133 for western hemlock. On the basis of a 50-year site curve, the mean site index is 106 for Douglas fir and 96 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 152 cubic feet per acre at age 60, and the CMAI for western hemlock is 205 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically.

Among the common forest understory plants are salal, Oregongrape, red huckleberry, thimbleberry, vine maple, willow, and western brackenfern.

This map unit is in capability subclass VIIe.

28—Colter cindery sandy loam, 0 to 30 percent slopes. This very deep, well drained soil is on foot slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown cindery sandy loam 6 inches thick. The substratum is white extremely cindery sand about 27 inches thick. Below this is a buried subsoil. The upper 15 inches is very dark grayish brown and yellowish brown sandy loam, the next 6 inches is gray cindery loamy sand, and the lower part to a depth of 60 inches or more is strong brown extremely cindery sand.

Included in this unit are small areas of Benham, Minniepeak, and Sinnice soils. Also included are small areas of Tradedollar soils. Included areas make up about 5 percent of the total acreage.

Permeability of this Colter soil is very rapid in the substratum and is moderately rapid in the upper part of the buried subsoil and very rapid in the lower part.

Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 113 for western hemlock and 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 80 for western hemlock and 90 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 166 cubic feet per acre per year at age 50, and for Douglas fir it is 110 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and noble fir.

The main limitation for harvesting timber is snowpack in winter. Use of wheeled and tracked equipment when the soil is moist produces ruts and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile substratum exhibit poor growth. Because the substratum is loose, trees occasionally are subject to windthrow.

Among the common forest understory plants are common beargrass, huckleberry, longtube twinflower, Indianpipe, and oneleaf foamflower.

This map unit is in capability subclass VIIe.

29—Colter cindery sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes and foot slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is very dark grayish brown cindery sandy loam. The substratum is white extremely cindery sand about 27 inches thick. The next layer is a buried subsoil. The upper 15 inches is very dark grayish brown and yellowish brown sandy loam, the next 6 inches is gray cindery loamy sand, and the lower part to a depth of 60 inches or more is strong brown extremely cindery sand.

Included in this unit are small areas of Benham, Minniepeak, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is very rapid in the substratum and is moderately rapid in the upper part of the buried subsoil and very rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 113 for western hemlock and 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 80 for western hemlock and 90 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 166 cubic feet per acre per year at age 50, and for Douglas fir it is 110 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and noble fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile substratum exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are common beargrass, huckleberry, longtube twinflower, Indianpipe, and oneleaf foamflower.

This map unit is in capability subclass VIIe.

30—Colter cindery sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is very dark grayish brown cindery sandy loam. The substratum is white extremely cindery sand 27 inches thick. The next layer is a buried subsoil. The upper 15 inches is very dark grayish brown and yellowish brown sandy loam, the next 6 inches is gray cindery loamy sand, and the lower part to a depth of 60 inches or more is strong brown extremely cindery sand.

Included in this unit are small areas of Benham, Minniepeak, and Sinnice soils. Also included are small areas of Rock outcrop and Colter soils that are less than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is very rapid in the substratum and is moderately rapid in the upper part of the buried subsoil and very rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 113 for western hemlock and 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 80 for western hemlock and 90 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 166 cubic feet per acre per year at age 50, and for Douglas fir it is 110 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and noble fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile substratum exhibit poor growth. Because the substratum is loose, trees occasionally are subject to windthrow.

Among the common forest understory plants are common beargrass, huckleberry, longtube twinflower, Indianpipe, and oneleaf foamflower.

This map unit is in capability subclass VIIe.

31—Colter cindery sandy loam, cold, 0 to 30 percent slopes. This very deep, well drained soil is on foot slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs.

Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is very dark grayish brown cindery sandy loam. The substratum is white extremely cindery sand 27 inches thick. The next layer is a buried subsoil. The upper 15 inches is very dark grayish brown and yellowish brown sandy loam, the next 6 inches is gray cindery loamy sand, and the lower part to a depth of 60 inches or more is strong brown extremely cindery sand.

Included in this unit are small areas of Cattcreek, Minniepeak, Sinnice, and Tradedollar soils. Also included are small areas of Colter soils that are less than 60 inches deep to bedrock. Included areas make up about 5 percent of the total acreage.

Permeability of this Colter soil is very rapid in the substratum and is moderately rapid in the upper part of the buried subsoil and very rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 91 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 65 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 107 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are subalpine fir and Douglas fir. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Use of wheeled and tracked equipment when the soil is moist produces ruts and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas of western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile substratum exhibit poor growth. Because the substratum is loose, trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, common beargrass, huckleberry, princes pine, and willow.

This map unit is in capability subclass VIIe.

32—Colter cindery sandy loam, cold, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes and foot slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is very dark grayish brown cindery sandy loam. The substratum is white extremely cindery sand 27 inches thick. The next layer is a buried subsoil. The upper 15 inches is very dark grayish brown and yellowish brown sandy loam, the next 6 inches is gray cindery loamy sand, and the lower part to a depth of 60 inches or more is strong brown extremely cindery sand.

Included in this unit are small areas of Cattcreek, Minniepeak, Sinnice, and Tradedollar soils. Also included are small areas of Colter soils that are less than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is very rapid in the substratum and is moderately rapid in the upper part of the buried subsoil and very rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 91 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 65 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 107 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are subalpine fir and Douglas fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile substratum exhibit poor growth. Because the substratum is loose, trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, common beargrass, huckleberry, princes pine, and willow.

This map unit is in capability subclass VIIe.

33—Colter cindery sandy loam, cold, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is very dark grayish brown cindery sandy loam. The substratum is white extremely cindery sand 27 inches thick. The next layer is a buried subsoil. The upper 15 inches is very dark grayish brown and yellowish brown sandy loam, the next 6 inches is gray cindery loamy sand, and the lower part to a depth of 60 inches or more is strong brown extremely cindery sand.

Included in this unit are small areas of Sinnice and Tradedollar soils. Also included are small areas of Cattcreek soils in cirque basins, Rock outcrop, and Colter soils that are less than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is very rapid in the substratum and is moderately rapid in the upper part of the buried subsoil and very rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 91 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 65 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 107 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are subalpine fir and Douglas fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile substratum exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, common beargrass, huckleberry, princes pine, and willow.

This map unit is in capability subclass VIIe.

34—Colter, cold-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Colter cindery sandy loam, cold, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Minniepeak, Sinnice, and Tradedollar soils. Also included are small areas of Cattcreek soils in cirque basins and Colter soils that are less than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

The Colter soil is very deep and well drained. It formed in layers of aerially deposited volcanic ash and pumice. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is very dark grayish brown cindery sandy loam. The substratum is white extremely cindery sand 27 inches thick. The next layer is a buried subsoil. The upper 15 inches is very dark grayish brown and yellowish brown sandy loam, the next 6 inches is gray cindery loamy sand, and the lower part to a depth of 60 inches or more is strong brown extremely cindery sand.

Permeability of this Colter soil is very rapid in the substratum and is moderately rapid in the upper part of the buried subsoil and very rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Rock outcrop in this unit is dominantly andesite and basalt. Numerous escarpments are present in this unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on the Colter soil. On the basis of a 100-year site curve, the mean site index is estimated to be 91 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 65 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 107 cubic feet per acre per year at age 60. The areas of Rock outcrop make up about 30 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are subalpine fir and Douglas fir.

The main limitations for harvesting timber are the areas of Rock outcrop, snowpack in winter, and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding areas of Rock outcrop forces yarding paths to converge, which increases compaction and erosion. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. The areas of Rock outcrop limit the even distribution of reforestation. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile substratum exhibit poor growth. Because the substratum is loose, trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, common beargrass, huckleberry, princes pine, and willow.

The Colter soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

35—Cryandepts, 45 to 120 percent slopes. These deep and very deep, moderately well drained and well drained soils are on north-facing mountain slopes. They formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed deciduous trees and shrubs. Elevation is 3,000 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 60 to 80 days.

No single profile is typical of Cryandepts, but one commonly observed in the survey area has a surface layer that is very dark brown sandy loam in the upper 13 inches and dark brown cindery sandy loam in the lower 3 inches. The upper 9 inches of the subsoil is light gray extremely cindery sand, and the lower 21 inches is dark brown sandy loam. The substratum to a depth of 60 inches or more is strong brown very cindery loamy sand. Depth to bedrock ranges from 50 to 60 inches or more.

Included in this unit are small areas of Minniepeak, Pelee, and Sinnice soils on ridgetops and back slopes. Also included are small areas of Rock outcrop and soils that are less than 40 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of these Cryandepts is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe.

This unit is used for wildlife habitat and watershed.

This unit is poorly suited to the production of timber. Vine maple, willow, and Sitka alder are the main shrub species on this unit. False Solomons seal, deerfoot vanillaleaf, and queencup beadlily are also common on this unit.

This map unit is in capability subclass VIIe.

36—Dougan very gravelly loam, 5 to 30 percent slopes. This moderately deep, well drained soil is on ridges of mountains. It formed in colluvium derived dominantly from andesite and granodiorite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,000 to 3,000 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown very gravelly loam 11 inches thick. The subsoil is light olive brown very gravelly loam 13 inches thick. The substratum is light yellowish brown extremely gravelly loam 15 inches thick over fractured andesite. Depth to bedrock ranges from 30 to 40 inches.

Included in this unit are small areas of Kinney, Skoly, and Zygore soils. Also included are small areas of soils that are shallow to bedrock and Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Dougan soil is moderately rapid. Available water capacity is low. Effective rooting depth is 32 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir, western hemlock, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 117 for Douglas fir and 113 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 90 for Douglas fir and 80 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 110 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 166 cubic feet at age 50. Estimates of the site index or CMAI for noble fir have not been made. Among the trees of limited extent is western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is occasional snowpack. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs readily. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Because the rooting depth is restricted by the underlying bedrock, trees occasionally are subject to windthrow.

Among the common forest understory plants are vine maple, red huckleberry, serviceberry, common beargrass, pachystima, bunchberry dogwood, Oregon oxalis, and creambush oceanspray.

This map unit is in capability subclass IVe.

37—Dougan very gravelly loam, 30 to 65 percent slopes. This moderately deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from andesite and granodiorite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,000 to 3,000 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 90 to 130 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown very gravelly loam 11 inches thick. The subsoil is light olive brown very gravelly loam 13 inches thick. The substratum is light yellowish brown extremely gravelly loam 15 inches thick over fractured andesite. Depth to bedrock ranges from 30 to 40 inches.

Included in this unit are small areas of Skoly and Zygore soils. Also included are small areas of soils that are shallow to bedrock, Rock outcrop, and Andic Cryumbrepts. Included areas make up about 8 percent of the total acreage.

Permeability of this Dougan soil is moderately rapid. Available water capacity is low. Effective rooting depth is 30 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir, western hemlock, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 117 for Douglas fir and 113 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 92 for Douglas fir and 80 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 110 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 166 cubic feet at age 50. Estimates of the site index or CMAI for noble fir have not been made. Among the trees of limited extent is western redcedar.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs readily. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Because the rooting depth is restricted by underlying bedrock, trees occasionally are subject to windthrow.

Among the common forest understory plants are vine maple, red huckleberry, serviceberry, common beargrass, pachystima, bunchberry dogwood, Oregon oxalis, and creambush oceanspray.

This map unit is in capability subclass VIIe.

38—Forsyth cindery loamy sand, 65 to 120 percent slopes. This very deep, somewhat excessively drained soil is on terrace escarpments. It formed in pyroclastic flow and lahar material with a thin mantle of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 8 inches, the surface layer is dark brown cindery loamy sand. The upper 11 inches of the underlying material is dark brown extremely cobbly sand, and the lower part to a depth of 60 inches or more is dark gray extremely stony sand.

Included in this unit are small areas of Pinchot and Swift soils on side slopes of mountains. Also included are small areas of Badland and Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Forsyth soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and lodgepole pine are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 110 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 85. The culmination of the mean annual increment (CMAI) for Douglas fir is 90 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for lodgepole pine have not been made. Among the trees of limited extent are western hemlock, western white pine, and Pacific silver fir.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or lodgepole pine seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile underlying material exhibit poor growth. Because the underlying material is loose, trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, kinnikinnick, salal, red huckleberry, princes pine, and lupine.

This map unit is in capability subclass VIIe.

39—Forsyth cobbly loamy sand, 0 to 30 percent slopes. This very deep, somewhat excessively drained soil is on terraces and terrace escarpments. It formed in pyroclastic flow and lahar material with a thin mantle of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,600 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 8 inches, the surface layer is very dark grayish brown cobbly loamy sand. The upper 11 inches of the underlying material is dark brown extremely cobbly sand, and the lower part to a depth of 60 inches or more is dark gray extremely stony sand.

Included in this unit are small areas of Pinchot, Polepatch, Shoestring, and St. Helens soils. Also included are small areas of poorly drained soils in depressional areas and Forsyth soils that have stones on the surface. Included areas make up about 10 percent of the total acreage.

Permeability of this Forsyth soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and lodgepole pine are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75. The culmination of the mean annual increment (CMAI) for Douglas fir is 81 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for lodgepole pine have not been made. Among the trees of limited extent are western hemlock, western white pine, and Pacific silver fir.

The main limitation for harvesting timber is occasional snowpack. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or lodgepole pine seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, western white pine, and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Trees occasionally are subject to windthrow. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile underlying material exhibit poor growth. Trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are Sitka alder, kinnikinnick, salal, red huckleberry, princes pine, and lupine.

This map unit is in capability subclass IVs.

40—Forsyth stony loamy sand, 0 to 30 percent slopes. This very deep, somewhat excessively drained soil is on terraces and terrace escarpments. It formed in pyroclastic flow and lahar material with a thin mantle of aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,600 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 8 inches, the surface layer is very dark grayish brown stony loamy sand. The upper 11 inches of the substratum is dark brown extremely cobbly sand, and the lower part to a depth of 60 inches or more is dark gray extremely stony sand.

Included in this unit are small areas of Pinchot, Polepatch, Shoestring, and St. Helens soils. Also included are small areas of poorly drained soils in depressional areas and Forsyth soils that have cobbles on the surface. Included areas make up about 10 percent of the total acreage.

Permeability of this Forsyth soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and lodgepole pine are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for Douglas fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 81 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for lodgepole pine have not been made. Among the trees of limited extent are western hemlock, western white pine, and Pacific silver fir.

The main limitation for harvesting timber is occasional snowpack. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir and lodgepole pine seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, western white pine, and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile underlying material exhibit poor growth. Because the surface layer and underlying material are loose, trees are occasionally subject to windthrow when winds are strong.

Among the common forest understory plants are Sitka alder, kinnikinnick, salal, red huckleberry, princes pine, and lupine.

This map unit is in capability subclass VIs.

41—Fortran cindery loamy sand, 65 to 120 percent slopes. This very deep, somewhat excessively drained soil is on terrace escarpments. It formed in pyroclastic flow and lahar material with a thin mantle of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,800 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 52 degrees F, and the average frost-free period is 115 to 135 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is dark brown cindery loamy sand. The upper 5 inches of the subsoil is dark yellowish brown cindery sandy loam, and the lower 6 inches is dark brown very gravelly sandy loam. The substratum to a depth of 60 inches or more is gray extremely gravelly loamy sand.

Included in this unit are small areas of Yalelake soils. Also included are small areas of Swift soils on side slopes of mountains, Badland, and Rock outcrop. Included areas make up about 5 percent of the total acreage.

Permeability of the Fortran soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 131 for Douglas fir and 130 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 100 for Douglas fir and 95 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 132 cubic feet per acre per year at age 70, and for western hemlock it is 200 cubic feet at age 50. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Logging roads generally need full bench construction and require frequent maintenance. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir and can delay natural reforestation of western hemlock unless controlled. Trees occasionally are subject to windthrow because of poor root development in the substratum.

Among the common forest understory plants are vine maple, bigleaf maple, western swordfern, false Solomons seal, and trailing blackberry.

This map unit is in capability subclass VIIe.

42—Haplumbrepts, 0 to 3 percent slopes. These very deep, somewhat poorly drained and moderately well drained soils are in depressional areas on river terraces adjacent to steep side slopes. They formed in gravelly alluvium derived dominantly from basalt, andesite, and some volcanic ash. The native vegetation is mainly hardwoods and scattered conifers. Elevation is 50 to 1,000 feet. The average annual precipitation is about 75 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 120 to 140 days.

No single profile is typical of Haplumbrepts, but one commonly observed in the survey area has a surface layer of very dark brown gravelly loam in the upper 3 inches and very dark brown gravelly clay loam in the lower 5 inches. The subsoil is mottled, very dark grayish brown cobbly clay loam and extremely cobbly clay loam 22 inches thick. The substratum to a depth of 60 inches or more is mottled, dark brown extremely gravelly loam.

Included in this unit are small areas of McBee soils and Washougal soils in well drained areas. Also included are small areas of poorly drained soils. Included areas make up about 10 percent of the total acreage.

Permeability of these Haplumbrepts is moderate. Available water capacity is moderately high. Effective rooting depth is limited by a seasonal high water table that is at a depth of as little as 0.5 foot to 3 feet from January to May. Runoff is slow, and the hazard of water erosion is slight. These soils are subject to brief periods of ponding after heavy winter rains.

This unit is used as woodland, pastureland, and wildlife habitat.

Red alder is the main woodland species on this unit. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for red alder. The culmination of the mean annual increment (CMAI) for red alder is 92 cubic feet per acre per year at age 40. Among the trees of limited extent are western redcedar and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment and mortality are the main concerns in the production of timber. Wetness reduces root respiration, which results in a low survival rate of seedlings. Reforestation can be accomplished by planting western redcedar seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is open, brush invades and can delay the establishment of western redcedar seedlings unless controlled. Because the rooting depth is restricted by a seasonal high water table, trees occasionally are subject to windthrow.

Among the common forest understory plants are vine maple, western swordfern, western brackenfern, salal, Oregongrape, trailing blackberry, and sedges.

This unit is suited to use as hayland and pastureland. The main limitation is seasonal soil wetness. Wetness limits the choice of plants and the period of grazing and increases the risk of suffocation from water in the root zone. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Excessive water on the surface can be removed by drainage ditches.

This map unit is in capability subclass IIIw.

43—Hatchet gravelly sandy loam, 30 to 65 percent slopes. This moderately deep, well drained soil is on back slopes and shoulder slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick over fractured andesite. Depth to andesite or basalt ranges from 20 to 40 inches.

Included in this unit are small areas of Cattcreek, Lonestar, Swift, Tradedollar, and Vanson soils. Also included are small areas of Rock outcrop and Hatchet soils that are less than 20 inches deep to bedrock. Included areas make up about 8 percent of the total acreage.

Permeability of this Hatchet soil is moderate. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 118 for western hemlock and 127 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 81 for western hemlock and 94 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 176 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 125 cubic feet at age 70. Estimates of the site index or CMAI for Pacific silver fir have not been made. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit. Among the trees of limited extent are noble fir and western redcedar.

The main limitations for harvesting timber are steepness of slope and snowpack in winter. Steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Because the rooting depth is restricted by underlying bedrock, trees occasionally are subject to windthrow. Windthrow is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of the unit.

Among the common forest understory plants are common beargrass, huckleberry, Oregongrape, princes pine, and starflower.

This map unit is in capability subclass VIIe.

44—Hatchet gravelly sandy loam, 65 to 90 percent slopes. This moderately deep, well drained soil is on back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick over fractured andesite. Depth to andesite or basalt ranges from 20 to 40 inches.

Included in this unit are small areas of Cattcreek, Lonestar, Swift, Tradedollar, and Vanson soils. Also included are small areas of Hatchet soils that are less than 20 inches deep to bedrock and small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Hatchet soil is moderate. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 118 for western hemlock and 127 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 81 for western hemlock and 94 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 176 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 125 cubic feet at age 70. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar.

The main limitations for harvesting timber are steepness of slope and snowpack in winter. Cable yarding systems generally are used on this unit. Unsurfaced roads and skid trails are slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Because the rooting depth is restricted by underlying bedrock, trees occasionally are subject to windthrow.

Among the common forest understory plants are common beargrass, huckleberry, Oregongrape, princes pine, and starflower.

This map unit is in capability subclass VIIe.

45—Hatchet gravelly sandy loam, cold, 30 to 65 percent slopes. This moderately deep, well drained soil is on back slopes and shoulder slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 4,500 feet. The average annual precipitation is about 110 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick over fractured andesite. Depth to andesite or basalt ranges from 20 to 40 inches.

Included in this unit are small areas of Cattcreek, Lonestar, Tradedollar, and Vanson soils. Also included are small areas of Rock outcrop and Hatchet soils that are less than 20 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Hatchet soil is moderate. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Western hemlock and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 84 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 60 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 95 cubic feet per acre per year at age 60. Estimates of the site index of CMAI for Pacific silver fir have not been made. Among the trees of limited extent are subalpine fir, noble fir, and Douglas fir. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitations for harvesting timber are steepness of slope and snowpack in winter. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by wester hemlock, Pacific silver fir, and subalpine fir occurs infrequently. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Because the rooting depth is restricited by the underlying bedrock, trees occasionally are subject to windthrow. Windthrow is higher in areas on ridgetops that are subject to stong, persistent winds than in other areas of the unit.

Among the common forest understory plants are common beargrass, huckleberry, Oregongrape, princes pine, and starflower.

This map unit is in capability subclass VIIe.

46—Hatchet gravelly sandy loam, cold, 65 to 90 percent slopes. This moderately deep, well drained soil is on back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 4,500 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick over fractured andesite. Depth to andesite or basalt ranges from 20 to 40 inches.

Included in this unit are small areas of Cattcreek, Lonestar, Tradedollar, and Vanson soils. Also included are small areas of Rock outcrop and Hatchet soils that are less than 20 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Hatchet soil is moderate. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Western hemlock and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 84 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 60 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 95 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir has not been made. Among the trees of limited extent are subalpine fir, noble fir, and Douglas fir.

The main limitations for harvesting timber are steepness of slope and snowpack in winter. Cable yarding systems generally are used on this unit. Unsurfaced roads and skid trails are slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, Pacific silver fir, and subalpine fir occurs infrequently. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Because the rooting depth is restricted by the underlying bedrock, trees occasionally are subject to windthrow.

Among the common forest understory plants are common beargrass, huckleberry, Oregongrape, princes pine, and starflower.

This map unit is in capability subclass VIIe.

47—Hatchet-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Hatchet gravelly sandy loam, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cattcreek, Swift, Tradedollar, and Vanson soils. Also included are small areas of Hatchet soils that are less than 20 inche deep to bedrock. Included areas make up about 10 percent of the total acreage.

The Hatchet soil is moderately deep and well drained. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inche thick. The surface layer is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick over fractured andesite. Depth to andesite or basalt ranges from 20 to 40 inches.

Permeability of this Hatchet soil is moderate. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists mainly of exposed areas of basalt and andesite. Numerous escarpments are in this unit.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on the Hatchet soil. On the basis of a 100-year site curve, the mean site index is 118 for western hemlock and 127 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 81 for western hemlock and 94 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 176 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 125 cubic feet at age 70. The areas of Rock outcrop make up about 30 percent of this unit and reduce the yield accordingly. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar.

The main limitations for harvesting timber are Rock outcrop, steepness of slope, and snowpack in winter. Cable yarding systems generally are used on this unit. Rock outcrop may cause breakage of timber when felled and can hinder yarding. Avoiding Rock outcrop forces yarding paths to converge, which increases compaction and erosion of the soil. Unsurfaced roads and skid trails are slippery and can be impassable whe wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. The areas of Rock outcrop limit the even distribution of reforestation. Because the rooting depth is restricted by the underlying bedrock, trees occasionally are subject to windthrow.

Among the common forest understory plants are common beargrass, huckleberry, Oregongrape, princes pine, and starflower.

The Hatchet soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

48—Hatchet, cold-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 4,500 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Hatchet gravelly sandy loam, cold, 30 to 65 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cattcreek, Tradedollar, and Vanson soils. Also included are small areas of Hatchet soils that are less than 20 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

The Hatchet soil is moderately deep and well drained. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick over fractured andesite. Depth to andesite or basalt ranges from 20 to 40 inches.

Permeability of this Hatchet soil is moderate. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe.

Rock outcrop consists of exposed areas of dominantly basalt and andesite. Numerous escarpments are in this unit.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Western hemlock and Pacific silver fir are the main woodland species on the Hatchet soil. On the basis of a 100-year site curve, the mean site index is estimated to be 84 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 60 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 95 cubic feet per acre per year at age 60. The areas of Rock outcrop make up about 30 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir has not been made. Among the trees of limited extent are subalpine fir, noble fir, and Douglas fir.

The main limitations for harvesting timber are the areas of Rock outcrop, steepness of slope, and snowpack in winter. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Rock outcrop may cause breakage of timber when felled and can hinder yarding. Avoiding Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, Pacific silver fir, and subalpine fir occurs infrequently. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. The areas of Rock outcrop limit the even distribution of reforestation. Because the rooting depth is restricted by underlying bedrock, trees occasionally are subject to windthrow.

Among the common forest understory plants are common beargrass, huckleberry, Oregongrape, princes pine, and starflower.

The Hatchet soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

49—Hatchet, cold-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 4,500 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Hatchet gravelly sandy loam, cold, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cattcreek, Tradedollar, and Vanson soils. Also included are small areas of Hatchet soils that are less than 20 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

The Hatchet soil is moderately deep and well drained. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick over fractured andesite. Depth to andesite or basalt ranges from 20 to 40 inches.

Permeability of this Hatchet soil is moderate. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists of exposed areas of dominantly basalt and andesite. Numerous escarpments are in this unit.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Western hemlock and Pacific silver fir are the main woodland species on the Hatchet soil. On the basis of a 100-year site curve, the mean site index is estimated to be 84 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 60 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 95 cubic feet per acre per year at age 60. The areas of Rock outcrop make up about 30 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are subalpine fir, noble fir, and Douglas fir.

The main limitations for harvesting timber are Rock outcrop, steepness of slope, and snowpack in winter. Cable yarding systems generally are used on this unit. Rock outcrop may cause breakage of timber when felled and can hinder yarding. Avoiding Rock outcrop forces yarding paths to converge, which increases compaction and erosion of the soil. Unsurfaced roads and skid trails are slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, Pacific silver fir, and subalpine fir occurs infrequently. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. The areas of Rock outcrop limit the even distribution of reforestation. Because the rooting depth is restricted by the underlying bedrock, trees occasionally are subject to windthrow.

Among the common forest understory plants are common beargrass, huckleberry, Oregongrape, princes pine, and starflower.

The Hatchet soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

50—Hesson clay loam, 5 to 15 percent slopes. This very deep, well drained soil is on terraces. It formed in mixed alluvium derived dominantly from quartzite and basic igneous rock. The native vegetation is mainly mixed conifers and grasses. Elevation is 400 to 1,000 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface layer is dark brown clay loam 19 inches thick. The upper 28 inches of the subsoil is dark reddish brown clay loam, and the lower part to a depth of 60 inches or more is dark reddish brown clay.

Included in this unit are small areas of Mossyrock soils on high terraces and Mountzion, Skoly, and Stevenson soils on foot slopes of mountains. Also included are small areas of Hesson soils that are less than 35 percent clay. Included areas make up about 10 percent of the total acreage.

Permeability of this Hesson soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for hayland, pastureland, cropland, woodland, wildlife habitat, recreation, and homesites.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing at least twice a year helps to maintain uniform growth and discourages selective grazing.

This unit is well suited to small grain. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of terraces, diversions, and grassed waterways.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 160 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 120. The culmination of the mean annual increment (CMAI) for Douglas fir is 170 cubic feet per acre per year at age 65. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are bigleaf maple, western hemlock, and western redcedar.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky, and they can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of seedlings unless controlled.

Among the common forest understory plants are vine maple, common snowberry, salal, Oregongrape, salmonberry, thimbleberry, Oregon oxalis, and fat false Solomons seal.

This unit is well suited to homesite development. The main limitations are steepness of slope, the hazard of erosion, low soil strength, and shrink-swell potential. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

If this unit is used for septic tank absorption fields, the limitation of restricted permeability can be overcome by increasing the size of the absorption field. The restricted permeability increases the possibility of failure of septic tank absorption fields. Use of sandy backfill for the trench and long absorption lines helps to compensate for the restricted permeability. Steepness of slope is a concern when installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass IIIe.

51—Hesson clay loam, 15 to 30 percent slopes. This very deep, well drained soil is on terraces. It formed in mixed alluvium derived dominantly from quartzite and basic igneous rock. The native vegetation is mainly mixed conifers and grasses. Elevation is 400 to 1,000 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface layer is dark brown clay loam 19 inches thick. The upper 28 inches of the subsoil is dark reddish brown clay loam, and the lower part to a depth of 60 inches or more is dark reddish brown clay.

Included in this unit are small areas of Mossyrock soils on high terraces and Mountzion, Skoly, and Stevenson soils on foot slopes and back slopes of mountains. Also included are small areas of Stevenson and Hesson soils that are less than 35 percent clay. Included areas make up about 10 percent of the total acreage.

Permeability of this Hesson soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for hayland, pastureland, woodland, wildlife habitat, recreation, and homesites.

This unit is well suited to use as hayland and pastureland. The main limitations are steepness of slope and the hazard of erosion. Erosion can be controlled by growing pasture. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 160 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 120. The culmination of the mean annual increment (CMAI) for Douglas fir is 170 cubic feet per acre per year at age 65. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are bigleaf maple, western hemlock, and western redcedar.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of seedlings unless controlled.

Among the common forest understory plants are vine maple, common snowberry, salal, Oregongrape, salmonberry, thimbleberry, Oregon oxalis, and fat false Solomons seal.

The main limitations of this unit for use as homesites are steepness of slope, low soil strength, shrink-swell potential, and the hazard of erosion. The hazard of erosion is increased if the soil is left exposed during site development. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. Buildings and roads should be designed to offset the effects of shrinking and swelling.

If this unit is used for septic tank absorption fields, the limitation of restricted permeability can be overcome by increasing the size of the absorption field. The restricted permeability and steepness of slope increase the possibility of failure of septic tank absorption fields. Use of sandy backfill for the trench and long absorption lines helps to compensate for the restricted permeability. During the rainy season, effluent from onsite sewage disposal systems may seep at points downslope.

This map unit is in capability subclass IVe.

52—Hesson clay loam, 30 to 40 percent slopes. This very deep, well drained soil is on terrace escarpments. It formed in mixed alluvium derived dominantly from quartzite and basic igneous rock. The native vegetation is mainly mixed conifers and grasses. Elevation is 400 to 1,000 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface layer is dark brown clay loam 19 inches thick. The upper 28 inches of the subsoil is dark reddish brown clay loam, and the lower part to a depth of 60 inches or more is dark reddish brown clay.

Included in this unit are small areas of Mountzion, Skoly, and Stevenson soils on back slopes of mountains. Also included are small areas Hesson soils that are less than 35 percent clay. Included areas make up about 10 percent of the total acreage.

Permeability of this Hesson soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, wildlife habitat, and recreation.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 160 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 120. The culmination of the mean annual increment (CMAI) for Douglas fir is 170 cubic feet per acre per year at age 65. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are bigleaf maple, western hemlock, and western redcedar.

The main limitation for harvesting timber is steepness of slope. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of seedlings unless controlled.

Among the common forest understory plants are vine maple, common snowberry, salal, Oregongrape, salmonberry, thimbleberry, Oregon oxalis, and fat false Solomons seal.

This map unit is in capability subclass VIe.

53—Histic Cryaquepts, 0 to 5 percent slopes. These very deep, very poorly drained and poorly drained soils are in depressional areas on mountains and terraces. They formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly grasses, shrubs, and scattered conifers. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 60 to 80 days.

No single profile is typical of Histic Cryaquepts, but one commonly observed in the survey area has a mat of very dark brown muck 13 inches thick. The surface layer is very dark gray loamy sand 8 inches thick. The subsoil is gray sandy loam 10 inches thick. The next 4 inches is a buried layer of very dark brown muck. The substratum to a depth of 60 inches or more is very dark brown gravelly coarse sand.

Included in this unit are small areas of Lonestar soils on ridgetops of mountains and Shoestring and St. Helens soils on terraces. Also included are small areas of moderately well drained soils and ponded soils. Included areas make up about 10 percent of the total acreage.

Permeability of these Histic Cryaquepts is moderate. Available water capacity is high. Effective rooting depth is limited by a seasonal high water table that is at a depth of 0 to 2 feet in November to July. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for wildlife habitat and recreation. It is poorly suited to the production of timber.

Common plants include rose, sedges, rushes, and scattered Pacific silver fir, western redcedar, willow, and Sitka alder.

This map unit is in capability subclass VIw.

54—Hoffstadt very gravelly sandy loam, 2 to 30 percent slopes. This deep, well drained soil is on foot slopes and back slopes of mountains. It formed in colluvium derived dominantly from basic igneous rock mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,600 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 150 to 180 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick.The surface layer is dark brown very gravelly sandy loam 4 inches thick. The subsoil is dark brown very cobbly sandy loam 32 inches thick. The substratum is dark brown extremely stony sandy loam 19 inches thick over fractured basalt. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Hatchet and Vanson soils. Also included are small areas of Cinnamon soils, Rock outcrop, and soils that are less than 35 percent rock fragments. Included areas make up about 15 percent of the total acreage.

Permeability of this Hoffstadt soil is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 150 for Douglas fir and 155 for western hemlock. On the basis of a 50-year site curve, the mean site index is 116 for Douglas fir and 108 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 158 cubic feet per acre per year at age 50, and the CMAI for western hemlock is 246 cubic feet at age 50. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is occasional snowpack. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs readily. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes.

Among the common forest understory plants are red huckleberry, Oregon oxalis, western swordfern, deer fern, trailing blackberry, Pacific trillium, and Oregongrape.

This map unit is in capability subclass IVe.

55—Hoffstadt very gravelly sandy loam, 30 to 65 percent slopes. This deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from basic igneous rock mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,600 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 150 to 180 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown very gravelly sandy loam 4 inches thick. The subsoil is dark brown very cobbly sandy loam 32 inches thick. The substratum is dark brown extremely stony sandy loam 19 inches thick over fractured basalt. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Hatchet and Vanson soils. Also included are small areas of Rock outcrop and soils that are less than 35 percent rock fragments. Included areas make up about 10 percent of the total acreage.

Permeability of this Hoffstadt soil is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 150 for Douglas fir and 155 for western hemlock. On the basis of a 50-year site curve, the mean site index is 116 for Douglas fir and 108 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 158 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 246 cubic feet at age 50. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Unsurfaced roads and skid trails are soft and slippery and can be impassable during rainy periods. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs readily. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes.

Among the common forest understory plants are red huckleberry, Oregon oxalis, western swordfern, deer fern, trailing blackberry, Pacific trillium, and Oregongrape.

This map unit is in capability subclass VIIe.

56—Hood loam, 15 to 30 percent slopes. This very deep, well drained soil is on dissected terraces. It formed in lacustrine deposits. The native vegetation is mainly mixed conifers and shrubs. Elevation is 320 to 560 feet. The average annual precipitation is about 43 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 150 to 180 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 8 inches thick. The subsoil to a depth of 60 inches or more is dark brown and dark yellowish brown loam.

Included in this unit are small areas of McElroy and Underwood soils on foot slopes of mountains. Also included are small areas of somewhat poorly drained soils and Hood soils that have slopes of less than 15 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Hood soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for woodland, pastureland, wildlife habitat, and recreation. A few areas are used as homesites.

Douglas fir is the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 147 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 112. The culmination of the mean annual increment (CMAI) for Douglas fir is 154 cubic feet per acre per year at age 60. Among the trees of limited extent are grand fir and ponderosa pine.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine and grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of planted Douglas fir seedlings and natural reforestation by ponderosa pine and can delay natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, western hazel, Pacific dogwood, Oregongrape, common snowberry, western brackenfern, and creambush oceanspray.

If this unit is used as pastureland, the main limitation is steepness of slope. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. The use of equipment is limited by steepness of slope. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage.

The main limitations of this unit for use as homesites are steepness of slope and the hazard of erosion in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

The soil in this unit is susceptible to frost action, which may limit construction of roads and streets. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

This map unit is in capability subclass IVe.

57—Kinney loam, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes and back slopes of mountains. It formed in residuum and colluvium derived dominantly from granodiorite and volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 600 to 2,300 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 125 to 145 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 12 inches thick. The upper 10 inches of the subsoil is strong brown gravelly clay loam, and the lower 6 inches is strong brown clay loam. The substratum to a depth of 60 inches or more is yellowish brown loam.

Included in this unit are small areas of Dougan soils on ridgetops and Aschoff, Mountzion, and Skoly soils. Also included are small areas of soils that are shallow to bedrock and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir, red alder, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 146 for Douglas fir and 147 for western hemlock. On the basis of a 50-year site curve, the mean site index is 117 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 153 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 232 cubic feet at age 50. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are western redcedar and noble fir.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, salal, red huckleberry, cascara buckthorn, Oregongrape, western hazel, trailing blackberry, Oregon fairybells, Oregon oxalis, Pacific trillium, western swordfern, and western brackenfern.

This map unit is in capability subclass IVe.

58—Kinney loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in residuum and colluvium derived dominantly from granodiorite and volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 600 to 2,300 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 125 to 145 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 12 inches thick. The upper 10 inches of the subsoil is strong brown gravelly clay loam, and the lower 6 inches is strong brown clay loam. The substratum to a depth of 60 inches or more is yellowish brown loam.

Included in this unit are small areas of Dougan soils on ridgetops and Aschoff, Mountzion, and Skoly soils. Also included are small areas of soils that are shallow to bedrock, Rock outcrop, and Kinney soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir, red alder, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 146 for Douglas fir and 147 for western hemlock. On the basis of a 50-year site curve, the mean site index is 117 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 153 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 232 cubic feet at age 50. Estimates of the site index or CMAI for red alder and western hemlock have not been made. Among the trees of limited extent are western redcedar and noble fir.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, salal, red huckleberry, cascara buckthorn, Oregongrape, western hazel, trailing blackberry, Oregon fairybells, Oregon oxalis, Pacific trillium, western swordfern, and western brackenfern.

This map unit is in capability subclass VIIe.

59—Kinney loam, 30 to 65 percent east slopes. This very deep, well drained soil is on east-facing back slopes of mountains. It formed in residuum and colluvium derived dominantly from granodiorite and volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,000 to 2,300 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 125 to 145 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 12 inches thick. The upper 10 inches of the subsoil is strong brown gravelly clay loam, and the lower 6 inches is strong brown clay loam. The substratum to a depth of 60 inches or more is yellowish brown loam.

Included in this unit are small areas of Dougan soils on ridgetops and Aschoff, Mountzion, and Skoly soils. Also included are small areas of soils that are shallow to bedrock, Rock outcrop, and Kinney soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir, western hemlock, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is 94 for Douglas fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 110 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for western hemlock and noble fir have not been made. Among the trees of limited extent are red alder and western redcedar. Cold, easterly winter winds reduce the productivity of this unit.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by noble fir and western hemlock unless controlled.

Among the common forest understory plants are vine maple, salal, red huckleberry, cascara buckthorn, Oregongrape, western hazel, trailing blackberry, Oregon fairybells, Oregon oxalis, Pacific trillium, western swordfern, and western brackenfern.

This map unit is in capability subclass VIIe.

60—Lithic Umbric Vitrandepts, 0 to 15 percent slopes. These very shallow and shallow, well drained soils are on recent lava flows. They formed in volcanic ash and pumice over andesite. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 100 to 115 days.

No single profile is typical of Lithic Umbric

Vitrandepts, but one commonly observed in the survey area has a surface layer of very dark brown sandy loam 2 inches thick. The subsoil is very dark grayish brown very cindery loamy sand 4 inches thick over andesitic lava flow. Depth to bedrock ranges from 5 to 15 inches.

Included in this unit are small areas of Cinnamon soils on foot slopes, Polepatch soils on fans, and St. Helens soils on terraces. Also included are small areas of Rock outcrop and soils that are moderately deep. Included areas make up about 5 percent of the total acreage.

Permeability of these Lithic Umbric Vitrandepts is moderately rapid. Available water capacity is very low. Effective rooting depth is 5 to 15 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for wildlife habitat, recreation, and watershed.

This unit is poorly suited to the production of timber.

Common plants include salal, huckleberry, kinnikinnick, creambrush oceanspray, common beargrass, and scattered lodgepole pine, western hemlock, and Douglas fir.

This map unit is in capability subclass VIIs.

61—Lonestar cindery sandy loam, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes, back slopes, and ridgetops of mountains. It formed in volcanic ash and pumice over colluvium derived from basic igneous rock. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is very dark grayish brown cindery sandy loam. The upper 7 inches of the subsoil is dark brown cindery sandy loam, and the lower 4 inches is grayish brown loamy sand. The substratum is yellowish brown cindery loamy sand about 10 inches thick. The next layer is a buried subsoil of dark yellowish brown gravelly loam 23 inches thick. Below this to a depth of 60 inches or more is a buried substratum of reddish yellow silt loam.

Included in this unit are small areas of Cinnamon, Hatchet, Swift, and Vanson soils. Also included are small areas of poorly drained soils in depressional areas. Included areas make up about 10 percent of the total acreage.

Permeability of this Lonestar soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and Douglas fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 112 for western hemlock and for Douglas fir. On the basis of a 50-year site curve, the mean site index is 79 for western hemlock and 84 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 164 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 101 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Reforestation can be accomplished by planting noble fir and Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit.

Among the common forest understory plants are huckleberry, lupine, rose, sedges, and common beargrass.

This map unit is in capability subclass VIe.

62—Lonestar cindery sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in volcanic ash and pumice over colluvium derived from basic igneous rock. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 120 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick.

Where mixed to a depth of 7 inches, the surface layer is very dark grayish brown cindery sandy loam. The upper 7 inches of the subsoil is dark brown cindery sandy loam, and the lower 4 inches is grayish brown loamy sand. The substratum is yellowish brown very cindery loamy sand about 10 inches thick. The next layer is a buried subsoil of dark yellowish brown gravelly loam 23 inches thick. Below this to a depth of 60 inches or more is a buried substratum of reddish yellow silt loam.

Included in this unit are small areas of Cinnamon, Hatchet, Swift, and Vanson soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Lonestar soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and Douglas fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 112 for western hemlock and for Douglas fir. On the basis of a 50-year site curve, the mean site index is 79 for western hemlock and 84 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 164 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 101 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitations for harvesting timber are snowpack in winter and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit.

Among the common forest understory plants are huckleberry, lupine, rose, sedges, and common beargrass.

This map unit is in capability subclass VIIe.

63—Lonestar cindery sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in volcanic ash and pumice over colluvium derived from basic igneous rock. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is very dark grayish brown cindery sandy loam. The upper 7 inches of the subsoil is dark brown cindery sandy loam, and the lower 4 inches is grayish brown loamy sand. The substratum is yellowish brown very cindery loamy sand 10 inches thick. The next layer is a buried subsoil of dark yellowish brown gravelly loam 23 inches thick. Below this to a depth of 60 inches or more is a buried substratum of reddish yellow silt loam.

Included in this unit are small areas of Cinnamon, Hatchet, Swift, and Vanson soils. Also included are small areas of Rock outcrop and Lonestar soils that are less than 40 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Lonestar soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and Douglas fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 112 for western hemlock and for Douglas fir. On the basis of a 50-year site curve, the mean site index is 79 for western hemlock and 84 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 164 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 101 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically.

Among the common forest understory plants are huckleberry, lupine, rose, sedges, and common beargrass.

This map unit is in capability subclass VIIe.

64—McBee silt loam. This very deep, moderately well drained soil is on flood plains and low river terraces. It formed in mixed alluvium derived dominantly from basalt and andesite. Slope is 0 to 3 percent. The native vegetation is mainly grasses and scattered conifers and hardwoods. Elevation is 50 to 200 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 160 to 180 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark brown and very dark grayish brown silt loam 13 inches thick. The upper 18 inches of the subsoil is very dark grayish brown silt loam and dark grayish brown silty clay loam, and the lower 12 inches is mottled, brown silt loam. The substratum to a depth of 60 inches or more is mottled, brown silt loam.

Included in this unit are small areas of Washougal soils on terraces and Pilchuck soils. Also included are small areas of somewhat poorly drained and poorly drained soils in depressional areas. Included areas make up about 15 percent of the total acreage.

Permeability of this McBee soil is moderate. Available water capacity is high. Effective rooting depth is limited by a seasonal high water table that is at a depth of 3 to 4 feet from March to May. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

This unit is used as hayland, pastureland, woodland, and wildlife habitat.

This unit is well suited to hay and pasture. The main limitations are seasonal soil wetness and the hazard of flooding. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of suffocation from water in the root zone. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage.

Douglas fir, black cottonwood, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 111 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 90. The culmination of the mean annual increment (CMAI) for Douglas fir is 100 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder and black cottonwood have not been made. Among the trees of limited extent are western redcedar and western hemlock.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings unless controlled.

Among the common forest understory plants are rose, spirea, willow, blackberry, grasses, and sedges.

This map unit is in capability subclass IIIw.

65—McDoug silt loam. This very deep, moderately well drained soil is on flood plains. It formed in mixed alluvium derived dominantly from basic igneous rock. Slope is 0 to 3 percent. The native vegetation is mainly grasses and scattered conifers and hardwoods. Elevation is 800 to 1,600 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 130 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown and dark brown silt loam 12 inches thick. The subsoil is dark brown and dark yellowish brown clay loam and loam 26 inches thick. The substratum to a depth of 60 inches or more is mottled, dark yellowish brown clay loam.

Included in this unit are small areas of Stabler and Washougal soils on terraces and Underwood soils on back slopes of mountains. Also included are small areas of Riverwash and poorly drained soils in depressional areas. Included areas make up about 10 percent of the total acreage.

Permeability of this McDoug soil is moderate. Available water capacity is high. Effective rooting depth is limited by a seasonal high water table that is at a depth of 2.5 to 3.5 feet at times from March through May. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

This unit is used as hayland, pastureland, woodland, and wildlife habitat.

This unit is well suited to use as hayland and pastureland. The main limitations are seasonal soil wetness and the hazard of flooding. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Mowing at least twice a year helps to maintain uniform growth and discourages selective grazing.

Douglas fir, red alder, and black cottonwood are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 144 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 110. The culmination of the mean annual increment (CMAI) for Douglas fir is 150 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder and black cottonwood have not been made. Among the trees of limited extent are western redcedar and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings unless controlled.

Among the common forest understory plants are vine maple, hawthorn, wild rose, blackberry, thimbleberry, and snowberry.

This map unit is in capability subclass IIIw.

66—McElroy gravelly loam, 5 to 15 percent slopes. This very deep, well drained soil is on foot slopes of mountains. It formed in colluvium derived dominantly from basalt with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 400 to 2,300 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 105 to 125 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown gravelly loam 10 inches thick. The subsoil to a depth of 60 inches or more is dark brown very gravelly loam and very cobbly loam.

Included in this unit are small areas of Chemawa, Timberhead, Underwood, and Undusk soils. Also included are small areas of Hood soils on dissected terraces and McElroy soils that are less than 35 percent rock fragments. Included areas make up about 10 percent of the total acreage.

Permeability of this McElroy soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, hayland, pastureland, homesites, wildlife habitat, and recreation.

Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 133 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 100. The culmination of the mean annual increment (CMAI) for Douglas fir is 134 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for ponderosa pine and grand fir have not been made. Among the trees of limited extent are Oregon white oak and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment and mortality are the main concerns in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine and grand fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can delay establishment of Douglas fir seedlings unless controlled.

Among the common forest understory plants are creambush oceanspray, vine maple, western hazel, Pacific dogwood, thimbleberry, Oregongrape, dwarf rose, common snowberry, and common yarrow.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing at least twice a year helps to maintain uniform growth and discourages selective grazing. In some years, supplemental irrigation is also needed.

The main limitation of this unit for use as homesites is the steepness of slope. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

This map unit is in capability subclass IIIe.

67—McElroy gravelly loam, 15 to 30 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from basalt with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 400 to 2,300 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 105 to 125 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown gravelly loam 10 inches thick. The subsoil to a depth of 60 inches or more is dark brown very gravelly loam and very cobbly loam.

Included in this unit are small areas of Chemawa, Timberhead, Underwood, and Undusk soils. Also included are small areas of Hood soils on dissected terraces and McElroy soils that have slopes of less than 15 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this McElroy soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for woodland, pastureland, hayland, wildlife habitat, recreation, and watershed. A few areas are used as homesites.

Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 134 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 100. The culmination of the mean annual increment (CMAI) for Douglas fir is 134 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for ponderosa pine and grand fir have not been made. Among the trees of limited extent are Oregon white oak and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment and mortality are the main concerns in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine and grand fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can delay establishment of Douglas fir seedlings.

Among the common forest understory plants are creambush oceanspray, vine maple, western hazel, Pacific dogwood, thimbleberry, Oregongrape, dwarf rose, common snowberry, and common yarrow.

This unit is well suited to use as hayland and pastureland. The main limitations are steepness of slope and the hazard of erosion. Erosion can be controlled by growing pasture. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing at least twice a year helps to maintain uniform growth and discourages selective grazing.

The main limitation of this unit for use as homesites is the steepness of slope. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Restricted permeability and steepness of slope increase the possibility of failure of septic tank absorption fields. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

This map unit is in capability subclass IVe.

68—McElroy gravelly loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from basalt with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 400 to 2,300 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 105 to 125 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown gravelly loam 10 inches thick. The subsoil to a depth of 60 inches or more is dark brown very gravelly loam and very cobbly loam.

Included in this unit are small areas of Chemawa, Timberhead, Underwood, and Undusk soils. Also included are small areas of McElroy soils that have slopes of less than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this McElroy soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 133 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 100. The culmination of the mean annual increment (CMAI) for Douglas fir is 134 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for ponderosa pine and grand fir have not been made. Among the trees of limited extent are Oregon white oak and bigleaf maple.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment and mortality are the main concerns in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine and grand fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can delay establishment of Douglas fir seedlings.

Among the common forest understory plants are creambush oceanspray, vine maple, western hazel, Pacific dogwood, thimbleberry, Oregongrape, dwarf rose, common snowberry, and common yarrow.

This map unit is in capability subclass VIe.

69—McElroy very stony loam, 5 to 15 percent slopes. This very deep, well drained soil is on foot slopes of mountains. It formed in colluvium derived dominantly from basalt with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 500 to 1,200 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 105 to 125 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. About 3 to 8 percent of the surface is covered with stones. The surface layer is very dark grayish brown very stony loam 10 inches thick. The subsoil is dark brown very cobbly loam 22 inches thick. The substratum to a depth of 60 inches or more is dark brown very gravelly loam and very cobbly loam.

Included in this unit are small areas of McElroy gravelly loam and Underwood soils. Also included are small areas of soils that do not have stones on the surface. Included areas make up about 7 percent of the total acreage.

Permeability of this McElroy soil is moderate. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used as woodland, pastureland, and wildlife habitat. A few areas are used as homesites.

Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 133 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 100. The culmination of the mean annual increment (CMAI) for Douglas fir is 134 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for ponderosa pine and grand fir have not been made. Among the trees of limited extent are Oregon white oak and bigleaf maple.

The main limitation for harvesting timber is the very stony surface layer. Stones on the surface hinder harvesting operations and can cause breakage of timber when felled. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can delay the establishmen of Douglas fir seedlings.

Among the common forest understory plants are creambush oceanspray, vine maple, western hazel, Pacific dogwood, thimbleberry, Oregongrape, dwarf rose, common snowberry, and common yarrow.

This unit is well suited to use as pastureland. The main limitation is the stones on the surface, which interfere with mowing, seeding, and spreading of anima manure. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

The main limitations of this unit for use as homesites are the stones on the surface and steepness of slope. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Removal of pebbles, cobbles, and stones in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

This map unit is in capability subclass VIs.

70—Minniepeak cindery sandy loam, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual a temperature is about 41 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is dark brown cindery sandy loam 3 inches thick, the next 5 inches is black loamy sand, and the lower part is very dark gray very cindery sandy loam 4 inches thick. The subsoil to depth of 60 inches or more is light gray and dark brown extremely cindery sand and extremely cindery coarse sand.

Included in this unit are small areas of Bandid, Pelee and Sinnice soils. Also included are small areas of Roc outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Minniepeak soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, Douglas fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 104 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. The surface layer is loose when dry, which limits the use of wheeled and tracked equipment. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival. The mortality rate of seedlings and the hazard of windthrow are higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are vine maple, Sitka alder, princes pine, red huckleberry, pearly everlasting, and willow.

This map unit is in capability subclass VIs.

71—Minniepeak cindery sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is dark brown cindery sandy loam 3 inches thick, the next part is black loamy sand 5 inches thick, and the lower part is very dark gray cindery sandy loam 4 inches thick. The subsoil to a depth of 60 inches or more is light gray and dark brown extremely cindery sand and extremely cindery coarse sand.

Included in this unit are small areas of Bandid, Pelee, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Minniepeak soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, Douglas fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 104 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is western redcedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are vine maple, Sitka alder, princes pine, huckleberry, pearly everlasting, and willow.

This map unit is in capability subclass VIIe.

72—Minniepeak cindery sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is dark brown cindery sandy loam 3 inches thick, the next part is black loamy sand 5 inches thick, and the lower part is brown very dark gray very cindery sandy loam 4 inches thick. The subsoil to a depth of 60 inches or more is light gray and dark brown extremely cindery sand and extremely cindery coarse sand.

Included in this unit are small areas of Bandid, Pelee, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Minniepeak soil is very rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, Douglas fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 104 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is western redcedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Because the subsoil is loose, trees occasionally are subject to windthrow.

Among the common forest understory plants are vine maple, Sitka alder, princes pine, huckleberry, pearly everlasting, and willow.

This map unit is in capability subclass VIIe.

73—Mossyrock silt loam, 2 to 5 percent slopes. This very deep, well drained soil is on high terraces. It formed in loess and alluvium derived dominantly from volcanic ash and basalt. The native vegetation is mainly grasses and scattered conifers. Elevation is 300 to 1,000 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 51 degrees F, and the average frost-free period is 175 to 195 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark brown silt loam 6 inches thick, and the lower part is dark brown silt loam 24 inches thick. The subsoil to a depth of 60 inches or more is dark brown silt loam.

Included in this unit are small areas of Hesson soils on terraces and Mountzion and Skoly soils on mountain slopes. Also included are small areas of Skamania and Mossyrock soils that have slopes of more than 5 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Mossyrock soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for hayland, pastureland, homesites, wildlife habitat, and recreation. A few areas are used as cropland and woodland.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

This unit is well suited to homesite development. It has few limitations. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Buildings and roads should be designed to offset limited ability of the soil on this unit to support a load. The soil is limited for the construction of roads and streets because of the potential for frost action.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 173 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 130 for Douglas fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 184 cubic feet per acre per year at age 65. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are bigleaf maple and western redcedar.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, salal, Oregongrape, Scotch broom, western swordfern, and thimbleberry.

This unit is well suited to small grain. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of terraces, diversions, and grassed waterways.

This map unit is in capability subclass IIe.

74—Mossyrock silt loam, 5 to 15 percent slopes. This very deep, well drained soil is on high terraces. It formed in loess and alluvium derived dominantly from volcanic ash and basalt. The native vegetation is mainly grasses and scattered conifers. Elevation is 300 to 1,000 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 51 degrees F, and the average frost-free period is about 175 to 195 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark brown silt loam 6 inches thick, and the lower part is dark brown silt loam 21 inches thick. The subsoil to a depth of 60 inches or more is dark brown silt loam.

Included in this unit are small areas of Hesson soils on terraces and Mountzion and Skoly soils on mountain slopes. Also included are small areas of Skamania and Mossyrock soils that have slopes of more than 15 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Mossyrock soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for hayland, pastureland, homesites, wildlife habitat, and recreation. A few areas are used as cropland and woodland.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

The main limitations of this unit for use as homesites are steepness of slope and the hazard of erosion. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The soil is susceptible to frost action, which may limit construction of roads and streets.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 173 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 130. The culmination of the mean annual increment (CMAI) for Douglas fir is 184 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are bigleaf maple and western redcedar.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, salal, Oregongrape, Scotch broom, western swordfern, and thimbleberry.

This unit is well suited to small grain. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of terraces, diversions, and grassed waterways.

This map unit is in capability subclass IIIe.

75—Mountzion clay loam, 2 to 15 percent slopes. This very deep, well drained soil is on foot slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt. The native vegetation is mainly mixed conifers and shrubs. Elevation is 600 to 1,500 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 130 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown clay loam 17 inches thick. The upper 30 inches of the subsoil is dark reddish brown silty clay loam, and the lower part to a depth of 60 inches or more is dark brown clay loam.

Included in this unit are small areas of Aschoff, Steever, Stevenson, and St. Martin soils on landslides. Also included are small areas of Mountzion soils that are more than 15 percent rock fragments. Included areas make up about 10 percent of the total acreage.

Permeability of this Mountzion soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for hayland, pastureland, woodland, homesites, and recreation.

Douglas fir, grand fir, red alder, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 149 for Douglas fir and 148 for western hemlock. On the basis of a 50-year site curve, the mean site index is 116 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 157 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 234 cubic feet at age 50. Estimates of the site index or CMAI for grand fir and red alder have not been made. Among the trees of limited extent is bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily and natural reforestation by grand fir and western hemlock occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by grand fir and western hemlock unless controlled.

Among the common forest understory plants are vine maple, Oregongrape, red huckleberry, Pacific dogwood, common snowberry, western hazel, thimbleberry, and western swordfern.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth.

The main limitations of this unit for use as homesites are the steepness of slope and the hazard of erosion in the steeper areas. Only the part of the site that is used for construction should be disturbed. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

The main limitations for septic tank absorption fields are the slope and moderate permeability. During the rainy season, effluent from onsite sewage disposal systems seep at points downslope. Steepness of slope is a concern when installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass IIIe.

76—Mountzion clay loam, 15 to 30 percent slopes. This very deep, well drained soil is on foot slopes and back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt. The native vegetation is mainly mixed conifers and shrubs. Elevation is 600 to 2,200 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 130 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown clay loam 17 inches thick. The upper 30 inches of the subsoil is dark reddish brown silty clay loam, and the lower part to a depth of 60 inches or more is dark brown clay loam.

Included in this unit are small areas of Aschoff and St. Martin soils on landslides. Also included are small areas of Mountzion soils that are more than 15 percent rock fragments. Included areas make up about 8 percent of the total acreage.

Permeability of this Mountzion soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, hayland, pastureland, wildlife habitat, and recreation.

Douglas fir, grand fir, red alder, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 149 for Douglas fir and 148 for western hemlock. On the basis of a 50-year site curve, the mean site index is 116 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 157 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 234 cubic feet at age 50. Estimates of the site index or CMAI for grand fir and red alder have not been made. Among the trees of limited extent are bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily and natural reforestation by grand fir and western hemlock occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by grand fir and western hemlock unless controlled.

Among the common forest understory plants are vine maple, Oregongrape, common snowberry, red huckleberry, Pacific dogwood, western hazel, thimbleberry, and western swordfern.

This unit is well suited to use as hayland and pastureland. The main limitation is steepness of slope. Erosion can be controlled by growing pasture plants. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing at least twice a year helps to maintain uniform growth and discourages selective grazing.

This map unit is in capability subclass IVe.

77—Mountzion clay loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt. Elevation is 600 to 2,200 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 130 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown clay loam 17 inches thick. The upper 30 inches of the subsoil is dark reddish brown silty clay loam, and the lower part to a depth of 60 inches or more is dark brown clay loam.

Included in this unit are small areas of Aschoff and St. Martin soils on landslides. Also included are small areas of Rock outcrop, shallow soils, and Mountzion soils that have slopes of less than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Mountzion soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, and recreation.

Douglas fir, grand fir, red alder, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 149 for Douglas fir and 148 for western hemlock. On the basis of a 50-year site curve, the mean site index is 116 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 159 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 234 cubic feet at age 50. Estimates of the site index or CMAI for grand fir and red alder have not been made. Among the trees of limited extent is bigleaf maple.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily and natural reforestation by grand fir and western hemlock occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by grand fir and western hemlock unless controlled.

Among the common forest understory plants are vine maple, Oregongrape, common snowberry, red huckleberry, Pacific dogwood, western hazel, thimbleberry, and western swordfern.

This map unit is in capability subclass VIe.

78—Pelee sandy loam, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is very dark grayish brown sandy loam. The upper 25 inches of the subsoil is dark gray very cindery coarse sand and light gray extremely cindery sand, and the lower part to a depth of 60 inches or more is dark brown and very dark grayish brown sandy loam and dark brown loamy sand.

Included in this unit are small areas of Bandid, Minniepeak, and Sinnice soils. Also included are small areas of Shoestring soils on terraces and Rock outcrop. Included areas make up about 8 percent of the total acreage.

Permeability of this Pelee soil is very rapid in the upper part of the subsoil and moderately rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and Douglas fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 104 for

Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are vine maple, willow, red huckleberry, western brackenfern, and pearly everlasting.

This map unit is in capability subclass VIs.

79—Pelee sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is very dark grayish brown sandy loam. The upper part of the subsoil is dark gray very cindery coarse sand and light gray extremely cindery sand 25 inches thick, and the lower part to a depth of 60 inches or more is dark brown and very dark grayish brown sandy loam and dark brown loamy sand.

Included in this unit are small areas of Bandid, Minniepeak, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 5 percent of the total acreage.

Permeability of this Pelee soil is very rapid in the upper part of the subsoil and moderately rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and Douglas fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 104 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are vine maple, willow, red huckleberry, western brackenfern, and pearly everlasting.

This map unit is in capability subclass VIIe.

80—Pelee sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is very dark grayish brown sandy loam. The upper 25 inches of the subsoil is dark gray very cindery coarse sand, light gray extremely cindery sand, and dark brown very cindery sand, and the lower part to a depth of 60 inches or more is dark brown and very dark grayish brown sandy loam and dark brown loamy sand.

Included in this unit are small areas of Bandid, Minniepeak, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Pelee soil is very rapid in the upper part of the subsoil and moderately rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and Douglas fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 104 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Reforestation can be accomplished by planting Douglas fir and noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are vine maple, willow, red huckleberry, western brackenfern, and pearly everlasting.

This map unit is in capability subclass VIIe.

81—Pelee-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

This unit is about 60 percent Pelee sandy loam, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bandid, Minniepeak, and Sinnice soils. Also included are small areas of Pelee soils that are more than 35 percent rock fragments. Included areas make up about 10 percent of the total acreage.

The Pelee soil is very deep and well drained. It formed in stratified, aerially deposited volcanic ash and pumice. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is very dark grayish brown sandy loam. The upper 25 inches of the subsoil is dark gray very cindery coarse sand, and the lower part to a depth of 60 inches or more is dark brown and very dark grayish brown sandy loam and dark brown loamy sand.

Permeability of this Pelee soil is very rapid in the upper part of the subsoil and moderately rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Rock outcrop consists of exposed areas of dominantly andesite. Numerous escarpments are in this unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and Douglas fir are the main woodland species on the Pelee soil. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 104 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. The areas of Rock outcrop make up about 30 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar.

The main limitations for harvesting timber are Rock outcrop, snowpack in winter, and steepness of slope. Cable yarding systems generally are used on this unit. Rock outcrop can cause breakage of timber when felled and can hinder yarding operations. Avoiding Rock outcrop forces yarding paths to converge, which increases compaction and erosion of the soil. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. The areas of Rock outcrop limit the even distribution of reforestation. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are vine maple, willow, huckleberry, western brackenfern, and pearly everlasting.

The Pelee soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

82—Pilchuck very fine sandy loam. This very deep, somewhat excessively drained soil is on flood plains. It formed in alluvium derived dominantly from basic igneous rock. Slope is 0 to 3 percent. The native vegetation is mainly mixed grasses and scattered hardwoods. Elevation is 50 to 200 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface layer is very dark grayish brown very fine sandy loam 9 inches thick. The upper 19 inches of the underlying material is dark brown fine sand and loamy fine sand, the next 18 inches is brown fine sand and dark grayish brown loamy fine sand, and the lower part to a depth of 60 inches or more is very dark grayish brown fine sandy loam.

Included in this unit are small areas of McBee, Bonneville, and Skamania soils on terraces. Also included are small areas of Skoly and Steever soils on mountain slopes and well drained soils. Included areas make up about 20 percent of the total acreage.

Permeability of this Pilchuck soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is limited by a high water table that is at a depth of 2 to 4 feet from November to April. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to occasional, brief periods of flooding from November to April.

This unit is used as pastureland (fig. 6), hayland, woodland, and wildlife habitat.

This unit is suited to use as hayland and pastureland. The main limitation is the hazard of flooding. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

Douglas fir and red alder are the main woodland

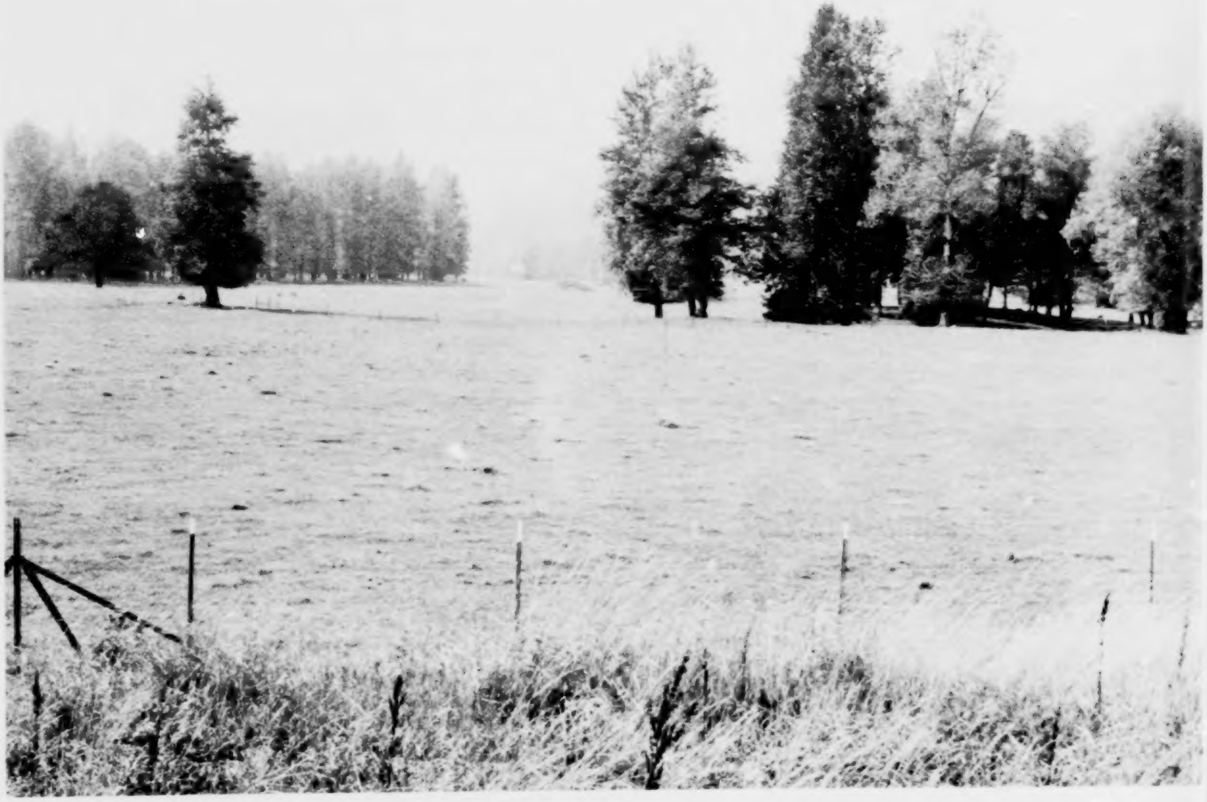


Figure 6.—Area of Pilchuck very fine sandy loam used as pastureland.

species on this unit. On the basis of a 100-year site curve, the mean site index is 152 for Douglas fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 161 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are western hemlock, western redcedar, bigleaf maple, and black cottonwood.

The main limitations for harvesting timber are seasonal soil wetness and the hazard of flooding. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. The surface layer is loose when dry, which limits the use of wheeled and tracked equipment. The high water table and occasional, long periods of flooding limit the use of equipment to dry periods. Disturbance of the protective layer of duff can be reduced with careful use of wheeled and tracked equipment.

Seedling establishment and mortality are the main concerns in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. Occasional, long periods of flooding reduce root respiration, which results in a low survival rate of seedlings. Droughtiness of the surface layer reduces seedling survival. If the canopy is opened, brush invades and can delay the establishment of seedlings unless controlled. Trees occasionally are subject to windthrow.

Among the common forest understory plants are vine maple, western swordfern, salmonberry, stinging nettle, Oregon oxalis, and western brackenfern.

This map unit is in capability subclass IVw.

83—Pillery fine sandy loam. This very deep, moderately well drained soil is on flood plains and low river terraces. It formed in alluvium derived dominantly from basic igneous rock. Slope is 0 to 3 percent. The native vegetation is mainly mixed grasses and scattered conifers and hardwoods. Elevation is 900 to 1,200 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark grayish brown fine sandy loam 9 inches thick, and the lower part is very dark grayish brown loam 11 inches thick. The upper 25 inches of the underlying material is dark brown and brown fine sandy loam, and the lower part to a depth of 60 inches or more is brown very gravelly loamy sand.

Included in this unit are small areas of Stabler and Stabbart soils on alluvial fans. Also included are small areas of organic soils and poorly drained soils in depressional areas. Included areas make up about 15 percent of the total acreage.

Permeability of this Pillery soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is limited by a seasonal high water table that is at a depth of 3 to 4 feet from March to May. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to occasional, brief periods of flooding in March to May. Channeling and deposition are common along streambanks.

This unit is used as woodland, pastureland, and wildlife habitat.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 153 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 115. The culmination of the mean annual increment (CMAI) for Douglas fir is 162 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are western redcedar, western hemlock, and black cottonwood.

The main limitations for harvesting timber are seasonal soil wetness and the hazard of flooding. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. When the surface layer is dry, it can be displaced readily by the use of equipment. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. Occasional, brief periods of flooding reduce root respiration, which results in a low survival rate of seedlings. If the canopy is opened, brush invades and can prevent the establishment of seedlings unless controlled.

Among the common forest understory plants are vine maple, salal, Oregongrape, trailing blackberry, and western swordfern.

This unit is well suited to pastureland. The main limitation is the hazard of flooding. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In some years, supplemental irrigation is also needed.

This map unit is in capability subclass IIIw.

84—Pinchot cindery sandy loam, 0 to 30 percent slopes. This very deep, well drained soil is on terraces and terrace escarpments. It formed in aerially deposited volcanic ash and pumice over lahar and alluvial sand and gravel. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,000 to 1,600 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 120 days.

Where mixed to a depth of 6 inches, the surface layer typically is dark brown cindery sandy loam. The upper 5 inches of the subsoil is very dark grayish brown fine sandy loam, and the lower 23 inches is dark brown cindery sandy loam and sandy loam. The upper 15 inches of the substratum is dark brown very gravelly loamy sand, and the lower part to a depth of 60 inches or more is brown very cobbly sand.

Included in this unit are small areas of St. Helens and Yalelake soils. Also included are small areas of Cinnamon and Swift soils on mountain slopes and poorly drained soils in depressional areas. Included areas make up about 10 percent of the total acreage.

Permeability of this Pinchot soil is moderate in the subsoil and rapid in the substratum. Available water capacity is moderately high. Effective rooting depth is

60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 138 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 105. The culmination of the mean annual increment (CMAI) for Douglas fir is 142 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for western hemlock have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled.

Among the common forest understory plants are salal, Oregongrape, princes pine, western brackenfern, deerfoot vanillaleaf, and red huckleberry.

This map unit is in capability subclass IVe.

85—Pinchot cindery sandy loam, 50 to 90 percent slopes. This very deep, well drained soil is on terrace escarpments. It formed in aerially deposited volcanic ash and pumice over lahar and alluvial sand and gravel. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,000 to 1,600 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 120 days.

Where mixed to a depth of 6 inches, the surface layer typically is dark brown cindery sandy loam. The upper 5 inches of the subsoil is very dark grayish brown fine sandy loam, and the lower 23 inches is dark brown cindery sandy loam and sandy loam. The upper 15 inches of the substratum is dark brown very gravelly loamy sand, and the lower part to a depth of 60 inches or more is brown very cobbly sand.

Included in this unit are small areas of Yalelake soils. Also included are small areas of Cinnamon and Swift soils on mountain slopes and small areas of Badland. Included areas make up about 10 percent of the total acreage.

Permeability of this Pinchot soil is moderate in the subsoil and rapid in the substratum. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 138 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 90. The culmination of the mean annual increment (CMAI) for Douglas fir is estimated to be 142 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for western hemlock have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings.

Among the common forest understory plants are salal, Oregongrape, princes pine, western brackenfern, deerfoot vanillaleaf, and red huckleberry.

This map unit is in capability subclass VIIe.

86—Pinoty sandy loam, 0 to 30 percent slopes. This very deep, well drained soil is on terraces. It formed in volcanic ash and pumice over lahar material and alluvial sand and gravel. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,000 to 1,500 feet. The average annual precipitation is about 120 inches, the average annual air temperature is about 52 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is dark brown sandy loam. The upper 15 inches of the subsoil is dark grayish brown sandy loam and dark grayish brown cindery loamy sand, and the lower 9 inches is dark yellowish brown sandy loam. The upper 15 inches of the substratum is yellowish brown sandy loam, and the lower part to a depth of 60 inches or more is grayish brown extremely gravelly loamy sand. Depth to the extremely gravelly part of the substratum ranges from 40 to 50 inches.

Included in this unit are small areas of Pinchot cindery sandy loam and Yalelake soils. Also included are small areas of poorly drained soils in depressional areas. Included areas make up about 5 percent of the total acreage.

Permeability of this Pinoty soil is moderate in the upper part of the substratum and rapid in the lower part. Available water capacity is moderately high. Effective rooting depth is 40 to 50 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 153 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 115 for Douglas fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 162 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for western hemlock have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled.

Among the common forest understory plants are vine maple, salal, western brackenfern, western swordfern, Oregongrape, and Pacific dogwood.

This map unit is in capability subclass IVe.

87—Pits. This map unit consists of quarries and gravel pits larger than 3 acres in size. Areas of this unit are on terraces and mountain slopes. The soil mantle in these areas has been removed, and sand, gravel, or crushed rock has been excavated. Small pits, less than 3 acres, are designated by a spot symbol on the soil maps. Most Pits support little if any vegetation.

This map unit is in capability subclass VIIIs.

88—Polepatch extremely bouldery loamy sand, 0 to 30 percent slopes. This very deep, somewhat excessively drained soil is on alluvial fans and terraces. It formed in lahar material with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown extremely bouldery loamy sand 12 inches thick. The underlying material to a depth of 60 inches or more is dark gray extremely cobbly sand and extremely stony coarse sand.

Included in this unit are small areas of Lonestar and Pelee soils on back slopes of mountains and Forsyth, Shoestring, and St. Helens soils on terraces. Also included are small areas of poorly drained soils in

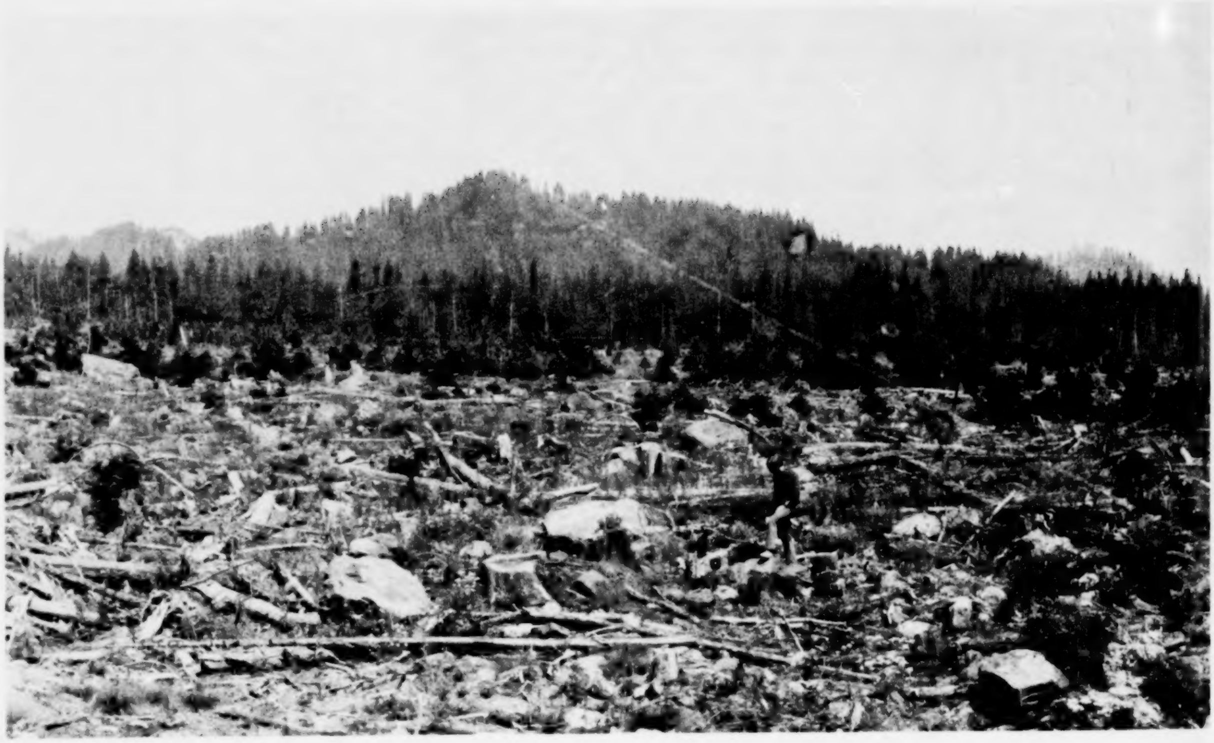


Figure 7.—Logged area of Polepatch extremely bouldery loamy sand, 0 to 30 percent slopes.

depressional areas and Polepatch soils that have a cobbly surface layer. Included areas make up about 10 percent of the total acreage.

Permeability of this Polepatch soil is rapid. Available water capacity is low. Effective rooting depth is 35 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, Douglas fir, and lodgepole pine are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 84 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 60. The culmination of the mean annual increment (CMAI) for western hemlock is 95 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir, Douglas fir, and lodgepole pine have not been made. Among the trees of limited extent are noble fir and western white pine.

The main limitations for harvesting timber are snowpack in winter and the boulders on the surface. Boulders on the surface may cause breakage of timber when felled and can hinder yarding operations (fig. 7). Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs infrequently. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile underlying material exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are kinnikinnick, penstemon, sedges, strawberry, and lupine.

This map unit is in capability subclass VIIs.

89—Polepatch extremely bouldery loamy sand, cold, 0 to 30 percent slopes. This very deep, somewhat excessively drained soil is on alluvial fans and terraces. It formed in lahar material with a mantle of volcanic ash. The native vegetation is mainly scattered conifers and shrubs. Elevation is 4,000 to 4,600 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown extremely bouldery loamy sand 12 inches thick. The underlying material to a depth of 60 inches or more is dark gray extremely cobbly sand, fine sandy loam, and extremely stony coarse sand.

Included in this unit are small areas of Lonestar and Pelee soils on back slopes of mountains and Shoestring soils on terraces. Also included are small areas of soils that are shallow or moderately deep to bedrock and Polepatch soils that have a cobbly surface layer. Included areas make up about 10 percent of the total acreage.

Permeability of this Polepatch soil is rapid. Available water capacity is low. Effective rooting depth is 35 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for recreation, wildlife habitat, and watershed. A few areas are used as woodland.

This unit is poorly suited to the production of timber. Pacific silver fir, subalpine fir, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 71 for western hemlock, and on the basis of a 50-year site curve, the mean site index is 50. The culmination of the mean annual increment (CMAI) for western hemlock is 75 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and subalpine fir have not been made. Among the trees of limited extent are lodgepole pine, noble fir, and Douglas fir.

The main limitations for harvesting timber are snowpack in winter and boulders on the surface. Boulders on the surface may cause breakage of timber when felled and can hinder yarding operations. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs infrequently. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Logging activities can readily displace the surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are kinnikinnick, penstemon, sedges, strawberry, and lupine.

This map unit is in capability subclass VIIs.

90—Riverwash. This map unit consists of very gravelly or sandy alluvium. It is on narrow flood plains adjacent to fast-moving streams and rivers. Slopes are 0 to 5 percent. The unit commonly is barren, but some areas support a sparse cover of cottonwood, willows, and grasses.

Included in this unit are small areas of McDoug and Pilchuck soils. Included areas make up about 10 percent of the total area.

Permeability of Riverwash is rapid or very rapid. Available water capacity is low. Runoff is slow, and the hazard of riparian erosion is severe. This unit is subject to frequent periods of flooding.

This unit is used as wildlife habitat.

This map unit is in capability subclass VIIIw.

91—Rock outcrop-Cattcreek complex, cold, 65 to 90 percent slopes. This map unit is on back slopes and in cirque basins on mountains. The native vegetation is mainly scattered true firs and shrubs. Elevation is 4,000 to 5,300 feet. The average annual precipitation is about 110 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 70 to 90 days.

This unit is about 60 percent Rock outcrop and 30 percent Cattcreek very cindery loamy sand, cold, 65 to 90 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Colter, Sinnice, and Tradedollar soils. Also included are small areas of Cattcreek soils that have slopes of less than 65 percent and have bedrock at a depth of 20 to 40 inches. Included areas make up about 10 percent of the total acreage.

The Cattcreek soil is deep and well drained. It formed in pumice and volcanic ash over residuum and colluvium derived dominantly from andesite. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 6 inches, the surface layer is dark grayish brown and dark yellowish brown very cindery loamy sand. The upper 9 inches of the subsoil is dark brown very cindery sand, and the lower 15 inches is strong brown extremely cindery sand. The next layer is a buried subsoil of dark yellowish brown extremely gravelly loam 24 inches thick over bedrock. Depth to bedrock ranges from 40 to 60 inches.

Permeability of this Cattcreek soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is severe.

Rock outcrop consists of exposed areas of dominantly andesite. Numerous escarpments are in this unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Pacific silver fir and western hemlock are the main woodland species on the Cattcreek soil. On the basis of a 100-year site curve, the mean site index is estimated to be 84 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 60. The culmination of the mean annual increment (CMAI) for western hemlock is 95 cubic feet per acre per year at age 60. The areas of Rock outcrop make up about 60 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are Douglas fir, noble fir, western white pine, and Alaska cedar.

The main limitations for harvesting timber are Rock outcrop, steepness of slope, and snowpack in winter. Cable yarding systems generally are used on this unit. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding Rock outcrop forces yarding paths to converge, which increases compaction and erosion of the soil. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto t road surface. Establishing plant cover on steeper slop that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unles plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover area by western hemlock and Pacific silver fir occurs infrequently. Droughtiness of the surface layer reduce seedling survival, especially on south- and southwest-facing slopes. Logging activities can readily displace t surface layer. Seedlings that grow in the less fertile subsoil exhibit poor growth. The areas of Rock outcro limit the even distribution of reforestation. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, common beargrass, Oregongrape, longtu twinflower, western brackenfern, and bunchberry dogwood.

The Rock outcrop is in capability subclass VIIIs, an the Cattcreek soil is in capability subclass VIIe.

92—Rock outcrop-Rubble land complex. This ma unit is on mountain slopes. It is barren. Elevation is 4,000 to 9,671 feet. The average annual precipitation about 130 inches, the average annual air temperatur about 35 degrees F, and the average frost-free seaso is 30 to 70 days.

This unit is about 60 percent Rock outcrop and 30 percent Rubble land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of Shoestring soils a snow and ice fields. Most of these areas are on Mou St. Helens.

Rock outcrop consists of exposed areas of basalt and andesite.

Rubble land consists of areas characterized by ste and very steep side slopes and avalanche tracks. It consists of about 90 percent fragmental rock, including cobbles, stones, and boulders.

This unit is used for esthetic value.

This map unit is in capability subclass VIIIs.

93—Rock outcrop-Xerorthents complex, 50 to 90 percent slopes. This map unit is on back slopes and escarpments of mountains. The native vegetation is mainly shrubs and scattered conifers. Elevation is 100 to 2,200 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 130 to 150 days.

This unit is about 65 percent Rock outcrop and 25 percent Xerorthents. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of McElroy, Skoly, and St. Martin soils on landslides. Included areas make up about 10 percent of the total acreage.

The Xerorthents are shallow to deep and are well drained. They formed in colluvium derived dominantly from basalt, andesite, and some volcanic ash. No single profile is typical of Xerothents, but one commonly observed in the survey area has a surface layer of very dark grayish brown gravelly loam 6 inches thick. The upper 13 inches of the underlying material is dark brown very gravelly loam, and the lower part to a depth of 31 inches is brown extremely gravelly clay loam over bedrock. Depth to bedrock ranges from 10 to 60 inches.

Permeability of the Xerorthents is moderately rapid. Available water capacity is low. Effective rooting depth s 10 to 60 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe.

Rock outcrop consists of exposed areas of dominantly basalt and andesite. Numerous escarpments are in this unit.

This unit is used as wildlife habitat and for esthetic value.

This unit is poorly suited to the production of timber. Scattered ponderosa pine and Oregon white oak are he main woodland species.

Among the common forest understory plants are common snowberry, Oregongrape, rose, trailing blackberry, and western hazel.

The Rock outcrop is in capability subclass VIIIs, and he Xerorthents are in capability subclass VIIs.

94—Shoestring fine sandy loam, 0 to 30 percent lopes. This very deep, well drained soil is on terraces nd terrace escarpments. It formed in aerially deposited volcanic ash and pumice over pyroclastic flow and lahar material. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,700 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 5 inches, the surface layer and upper part of the subsoil are very dark gray fine sandy loam. The next 3 inches of the subsoil is dark gray very gravelly sand, and the lower 16 inches is dark brown sandy loam and very dark brown loamy sand. The substratum to a depth of 60 inches or more is dark grayish brown very cobbly sand and dark gray very gravelly sand.

Included in this unit are small areas of Lonestar and Pelee soils on mountain slopes and Forsyth, Polepatch, and St. Helens soils on terraces and terrace escarpments. Also included are small areas of poorly drained soils in depressional areas. Included areas make up about 10 percent of the total acreage.

Permeability of this Shoestring soil is moderate in the subsoil and rapid in the substratum. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 104 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western white pine.

The main limitation for harvesting timber is snowpack in winter. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are salal, red huckleberry, false Solomons seal, trillium, and bunchberry dogwood.

This map unit is in capability subclass VIs.

95—Shoestring fine sandy loam, 50 to 90 percent slopes. This very deep, well drained soil is on terrace escarpments. It formed in aerially deposited volcanic ash and pumice over pyroclastic flow and lahar material. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,700 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 5 inches, the surface layer and the upper part of the subsoil are very dark gray fine sandy loam. The next 3 inches of the subsoil are dark gray very gravelly sand, and the lower 16 inches is dark brown sandy loam and very dark brown loamy sand. The substratum to a depth of 60 inches or more is dark grayish brown very cobbly sand and dark gray very gravelly sand.

Included in this unit are small areas of Bandid, Bannel, Lonestar, and Pelee soils on mountain slopes. Also included are small areas of Rock outcrop and Badland. Included areas make up about 10 percent of the total acreage.

Permeability of this Shoestring soil is moderate in the subsoil and rapid in the substratum. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 105 for western hemlock and 110 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 75 for western hemlock and 80 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 151 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 89 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western white pine.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Unsurfaced roads and skid trails are slippery and can be impassable whe wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need ful bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Reforestation can be accomplished by planting noble fir and Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are salal, huckleberry, false Solomons seal, trillium, and bunchberry dogwood.

This map unit is in capability subclass VIIe.

96—Sinnice extremely cindery loamy sand, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in aerially deposited layers of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer and upper part of the subsoil are light gray extremely cindery loamy sand. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are small areas of Colter, Minniepeak, and Pelee soils. Included areas make up about 5 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid in the subsoil and very rapid in the substratum. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, Douglas fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 113 for western hemlock and 110 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 80 for western hemlock and 85 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 166 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 98 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. The surface layer is loose when dry, which limits the use of wheeled and tracked equipment. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir and Douglas fir seedlings. If seed trees are present, natural eforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on outh- and southwest-facing slopes. The high emperature of the surface layer in summer reduces eedling survival. The mortality rate of seedlings and he hazard of windthrow are higher in areas on dgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are red huckleberry, western brackenfern, vine maple, princes pine, Sitka alder, and willow.

This map unit is in capability subclass VIs.

97—Sinnice extremely cindery loamy sand, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited layers of volcanic ash and pumice. The native vegetation is mainly mixed conifers. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is light gray extremely cindery loamy sand. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are small areas of Colter, Minniepeak, and Pelee soils. Also included are small areas of Sinnice soils that have more than 20 inches of pumice on the surface. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid in the subsoil and very rapid in the substratum. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, Douglas fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 113 for western hemlock and 110 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 80 for western hemlock and 85 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 166 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 98 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is western redcedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. The high temperature of the surface layer in summer reduces seedling survival. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are red huckleberry, western brackenfern, vine maple, princes pine, Sitka alder, and willow.

This map unit is in capability subclass VIIe.

98—Sinnice extremely cindery loamy sand, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited layers of volcanic ash and pumice. The native vegetation is mainly mixed conifers. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is light gray extremely cindery loamy sand. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are small areas of Colter, Minniepeak, and Pelee soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid the subsoil and very rapid in the substratum. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, Douglas fir, and noble fir are the main woodland species on this unit. O the basis of a 100-year site curve, the mean site index is estimated to be 113 for western hemlock and 110 fo Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 80 for western hemlock and 85 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 166 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 98 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fi and noble fir have not been made. Among the trees of limited extent is western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Logging roads generally need full bench construction and require frequent maintenance. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. The high temperature of the surface layer in summer reduces seedling survival. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the forest understory plants are red huckleberry, western brackenfern, vine maple, princes pine, Sitka alder, and willow.

This map unit is in capability subclass VIIe.

99—Sinnice extremely cindery loamy sand, cold, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in aerially deposited layers of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is light gray extremely cindery loamy sand. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are small areas of Colter, Minniepeak, and Pelee soils. Also included are small areas of Sinnice soils that have more than 20 inches of pumice on the surface. Included areas make up about 5 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid in the subsoil and very rapid in the substratum. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 70. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is subalpine fir. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. The surface layer is loose when dry, which limits the use of wheeled and tracked equipment. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, Pacific silver fir, and subalpine fir occurs infrequently. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. The mortality rate of seedlings and the hazard of windthrow are higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are red huckleberry, western brackenfern, vine maple, princes pine, Sitka alder, common beargrass, and willow.

This map unit is in capability subclass VIs.

100—Sinnice extremely cindery loamy sand, cold, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited layers of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is light gray extremely cindery loamy sand. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are small areas of Colter, Minniepeak, and Pelee soils. Also included are small areas of Sinnice soils that have more than 20 inches of pumice on the surface. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid in the subsoil and very rapid in the substratum. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 70. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is subalpine fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, Pacific silver fir, and subalpine fir occurs infrequently. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are re huckleberry, western brackenfern, vine maple, princes pine, Sitka alder, common beargrass, and willow.

This map unit is in capability subclass VIIe.

101—Sinnice extremely cindery loamy sand, cold 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerial deposited layers of volcanic ash and pumice. The nat vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual temperature is about 38 degrees F, and the average frost-free season is 75 to 90 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thic Where mixed to a depth of 7 inches, the surface laye light gray extremely cindery loamy sand. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand The substratum to a depth of 60 inches or more is ligh gray extremely cindery sand.

Included in this unit are small areas of Colter, Minniepeak, and Pelee soils. Also included are small areas of Sinnice soils that have more than 20 inches pumice on the surface. Included areas make up abou 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid the subsoil and very rapid in the substratum. Availabl water capacity is moderate. Effective rooting depth is inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on this unit. On the basis a 100-year site curve, the mean site index is estimate to be 98 for western hemlock, and on the basis of a 5 year site curve, the mean site index is estimated to be 70. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. Estimates of the site index or CMA for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is subalpine fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-roun use. Rock for road construction is not readily availabl in this unit. Logging roads generally need full bench construction and frequent maintenance. Snowpack in winter limits the use of equipment and restricts access

Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, Pacific silver fir, and subalpine fir occurs infrequently. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are red huckleberry, western brackenfern, vine maple, princes pine, Sitka alder, common beargrass, and willow.

This map unit is in capability subclass VIIe.

102—Sinnice, cold-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

This unit is about 70 percent Sinnice extremely cindery loamy sand, cold, 65 to 90 percent slopes, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Colter and Minniepeak soils. Also included are small areas of Sinnice soils that are less than 40 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

The Sinnice soil is very deep and well drained. It formed in aerially deposited layers of volcanic ash and pumice. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 7 inches, the surface layer is light gray extremely cindery loamy sand. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Permeability of the Sinnice soil is moderately rapid in the subsoil and very rapid in the substratum. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Rock outcrop consists mainly of exposed areas of andesite and basalt. Numerous escarpments are in this unit.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on the Sinnice soil. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 70. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. The areas of Rock outcrop make up about 20 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent is subalpine fir. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitations for harvesting timber are Rock outcrop, snowpack in winter, and steepness of slope. Cable yarding systems generally are used on this unit. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides may occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock, Pacific silver fir, and subalpine fir occurs infrequently. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. The areas of Rock outcrop limit the even distribution of reforestation. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are red huckleberry, western brackenfern, vine maple, princes pine, Sitka alder, common beargrass, and willow.

The Sinnice soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

103—Skamania very fine sandy loam, 0 to 8 percent slopes. This very deep, well drained soil is on terraces. It formed in mixed alluvium derived dominantly from basalt, andesite, and some volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 800 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 10 inches, the surface layer is dark brown very fine sandy loam. The upper 17 inches of the subsoil is dark yellowish brown very fine sandy loam, and the lower 16 inches is dark brown fine sandy loam. The substratum to a depth of 60 inches or more is dark yellowish brown loamy fine sand.

Included in this unit are small areas of Stabler and Washougal soils and Steever soils on mountain slopes. Also included are small areas of Skamania and Skoly soils that have slopes of more than 8 percent and are on mountain slopes. Included areas make up about 15 percent of the total acreage.

Permeability of this Skamania soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for hayland, pastureland, homesites, woodland, wildlife habitat, and recreation.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

This unit is well suited to homesite development. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. The soil is susceptible to frost action, which may limit construction of roads and streets.

Douglas fir, western hemlock, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 151 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 114. The culmination of the mean annual increment (CMAI) for Douglas fir is 159 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for western hemlock and red alder have not been made. Among the trees of limited extent are grand fir and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, creambush oceanspray, trailing blackberry, salal, western hazel, dwarf rose, common snowberry, and western swordfern.

This map unit is in capability subclass IIe.

104—Skamania very fine sandy loam, 8 to 15 percent slopes. This very deep, well drained soil is on terraces. It formed in mixed alluvium derived dominantly from basalt, andesite, and some volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 800 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 10 inches, the surface layer is very dark brown and dark brown very fine sandy loam. The upper 17 inches of the subsoil is dark yellowish brown very fine sandy loam, and the lower 16 inches is dark brown fine sandy loam. The substratum to a depth of 60 inches or more is dark yellowish brown loamy fine sand.

Included in this unit are small areas of Stabler and Washougal soils and Steever soils on mountain slopes. Also included are small areas of Skamania and Skoly soils that have slopes of less than 8 percent or more than 15 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Skamania soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used for hayland, pastureland, homesites, woodland, wildlife habitat, and recreation.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

This unit is well suited to homesite development. The main limitations are steepness of slope and the hazard of erosion in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Structures to divert runoff are needed if buildings and roads are constructed. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. This soil is subject to frost action, which may limit construction of roads and streets.

Douglas fir, western hemlock, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 151 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 114. The culmination of the mean annual increment (CMAI) for Douglas fir is 159 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for western hemlock and red alder have not been made. Among the trees of limited extent are grand fir and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, creambush oceanspray, trailing blackberry, salal, western hazel, dwarf rose, common snowberry, and western swordfern.

This map unit is in capability subclass IIIe.

105—Skamania very fine sandy loam, 15 to 30 percent slopes. This very deep, well drained soil is on terraces. It formed in mixed alluvium derived dominantly from basalt, andesite, and some volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 800 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 10 inches, the surface layer is very dark brown and dark brown very fine sandy loam. The upper 17 inches of the subsoil is dark yellowish brown very fine sandy loam, and the lower 16 inches is dark brown fine sandy loam. The substratum to a depth of 60 inches or more is dark yellowish brown loamy fine sand.

Included in this unit are small areas of Washougal gravelly loam and Stabler and Steever soils on mountain slopes. Also included are small areas of Skoly soils on mountain slopes and Skamania soils that have slopes of less than 15 percent or more than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Skamania soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of erosion is moderate.

Most areas of this unit are used for pastureland, homesites, woodland, wildlife habitat, or recreation.

This unit is well suited to use as pastureland. The main limitations are steepness of slope and the hazard of erosion. Erosion can be controlled by growing pasture. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Fertilizer is needed to ensure optimum growth of grasses and legumes.

Douglas fir, western hemlock, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 151 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 114. The culmination of the mean annual increment (CMAI) for Douglas fir is 159 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for western hemlock and red alder have not been made. Among the trees of limited extent are grand fir and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, creambush oceanspray, trailing blackberry, salal, western hazel, dwarf rose, common snowberry, and western swordfern.

The main limitations of this unit for use as homesites are the steepness of slope and the hazard of erosion. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Steepness of slope is a concern in installing septic tank absorption fields. Access roads should be designed to provide adequate cut-slope grade, and cross drains are needed to control surface runoff and keep soil losses to a minimum. This soil is subject to frost action, which may limit construction of roads and streets.

This map unit is in capability subclass IVe.

106—Skamania very fine sandy loam, 30 to 40 percent slopes. This very deep, well drained soil is on terrace escarpments. It formed in mixed alluvium derived dominantly from basalt, andesite, and some volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 400 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. Where mixed to a depth of 10 inches, the surface layer is very dark brown and dark brown very fine sandy loam. The upper 17 inches of the subsoil is dark yellowish brown very fine sandy loam, and the lower 16 inches is dark brown fine sandy loam. The substratum to a depth of 60 inches or more is dark yellowish brown loamy fine sand.

Included in this unit are small areas of Stabler and Washougal soils and St. Martin soils on landslides. Also included are small areas of Skamania and Skoly soils that have slopes of less than 30 percent and are on mountain slopes. Included areas make up about 15 percent of the total acreage.

Permeability of this Skamania soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, and recreation.

Douglas fir, western hemlock, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 151 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 114. The culmination of the mean annual increment (CMAI) for Douglas fir is 159 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for western hemlock and red alder have not been made. Among the trees of limited extent are grand fir and bigleaf maple.

The main limitation for harvesting timber is steepness of slope. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless they are protected by plant cover or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, creambush oceanspray, trailing blackberry, salal, western hazel, dwarf rose, common snowberry, and western swordfern.

This map unit is in capability subclass VIe.

107—Skelida silt loam, 5 to 15 percent slopes. This very deep, well drained soil is on terraces. It formed in loess and alluvium derived dominantly from basalt and andesite. The vegetation in areas not cultivated is mainly grass and scattered conifers. Elevation is 400 to 1,000 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 160 to 180 days.

Typically, the surface layer is very dark grayish brown silt loam 15 inches thick. The subsoil to a depth of 60 inches or more is dark yellowish brown silt loam.

Included in this unit are small areas of Hesson, Mountzion, and Skoly soils on mountain slopes. Also included are small areas of Skelida soils that have a clay loam surface layer. Included areas make up about 15 percent of the total acreage.

Permeability of this Skelida soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as cropland, pastureland, and hayland. It is also used for homesites, wildlife habitat, recreation, and woodland.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

This unit is well suited to small grain. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of terraces, diversions, and grassed waterways.

The main limitations of this unit for use as homesites are the steepness of slope and the hazard of erosion. Population growth has resulted in increased construction of homes on this unit. Preserving the existing plant cover during construction helps to control erosion. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. Buildings and roads should be designed to offset the effects of shrinking and swelling. This soil is subject to frost action, which may limit construction of roads and streets.

Douglas fir, western hemlock, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 160 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 120. The culmination of the mean annual increment (CMAI) for Douglas fir is 170 cubic feet per acre per year at age 65. Estimates of the site index or CMAI for western hemlock and red alder have not been made. Among the trees of limited extent is bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, salal, western hazel, dwarf rose, trailing blackberry, and cascara buckthorn.

This map unit is in capability subclass IIIe.

108—Skelida silt loam, 15 to 30 percent slopes. This very deep, well drained soil is on terraces. It formed in loess and alluvium derived dominantly from basalt and andesite. The vegetation in areas not cultivated is mainly grass and scattered conifers. Elevation is 400 to 1,000 feet. The average annual precipitation is about 60 inches, the average annual air temperature is 50 degrees F, and the average frost-free period is 160 to 180 days.

Typically, the surface layer is very dark grayish brown silt loam 15 inches thick. The subsoil to a depth of 60 inches or more is dark yellowish brown silt loam.

Included in this unit are small areas of Hesson, Mountzion, and Skoly soils on mountain slopes. Also included are small areas of Skelida soils that have a clay loam surface layer and slopes of more than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Skelida soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as pastureland. It is also used for wildlife habitat, recreation, woodland, and homesites.

This unit is suited to use as pastureland. The main limitations are slope and the hazard of erosion. Erosion can be controlled by growing pasture. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

Douglas fir, western hemlock, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 160 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 120 for Douglas fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 170 cubic feet per acre per year at age 65. Estimates of the site index or CMAI for western hemlock and red alder have not been made. Among the trees of limited extent is bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, salal, western hazel, dwarf rose, trailing blackberry, and cascara buckthorn.

The main limitations of this unit for use as homesites are steepness of slope and the hazard of erosion. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Steepness of slope is a concern in installing septic tank absorption fields. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. Buildings and roads should be designed to offset the effects of shrinking and swelling. This soil is subject to frost action, which may limit construction of roads and streets.

This map unit is in capability subclass IVe.

109—Skoly stony loam, 2 to 15 percent slopes. This very deep, well drained soil is on mountain slopes. It formed in colluvium derived dominantly from basalt. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 2,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick.

The upper 5 inches of the surface layer is dark brown stony loam, and the lower 12 inches is dark brown very cobbly loam. The subsoil is dark brown very cobbly loam 23 inches thick. The substratum to a depth of 60 inches or more is dark brown very cobbly loam.

Included in this unit are small areas of Aschoff, Steever, Mountzion, and Skamania soils on terraces. Also included are small areas of Skoly soils that are less than 35 percent rock fragments or have slopes of more than 15 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Skoly soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, hayland, pastureland, homesites, wildlife habitat, and recreation.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 144 for Douglas fir and 140 for western hemlock. On the basis of a 50-year site curve, the mean site index is 111 for Douglas fir and 100 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 218 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 150 cubic feet at age 60. Among the trees of limited extent are red alder, bigleaf maple, and western redcedar.

The main limitations for harvesting timber are stones on the surface and seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Stones on the surface hinder harvesting and can cause breakage of timber. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, salal, western hazel, Oregongrape, trailing blackberry, western swordfern, Oregon oxalis, and deerfoot vanillaleaf.

This unit is well suited to use as hayland and pastureland. The main limitation is large stones in and on the surface layer. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

The main limitations of this unit for use as homesites are the steepness of slope, shrink-swell potential, large stones, and hazard of erosion in the steeper areas. Only the part of the site that is used for construction should be disturbed. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Removal of pebbles, cobbles, and stones in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Buildings and roads should be designed to offset the effects of shrinking and swelling.

This map unit is in capability subclass IVs.

110—Skoly stony loam, 15 to 30 percent slopes. This very deep, well drained soil is on mountain slopes. It formed in colluvium derived dominantly from basalt. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 2,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper 5 inches of the surface layer is dark brown stony loam, and the lower 12 inches is dark brown very cobbly loam. The subsoil is dark brown very cobbly loam 23 inches thick. The substratum to a depth of 60 inches or more is dark brown very cobbly loam.

Included in this unit are small areas of Aschoff, Steever, Mountzion, and Skamania soils on terraces. Also included are small areas of Skoly soils that are less than 35 percent rock fragments or have slopes of more than 30 percent or less than 15 percent. Included areas make up about 12 percent of the total acreage.

Permeability of this Skoly soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, hayland, pastureland, wildlife habitat, and recreation.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 144 for Douglas fir and 140 for western hemlock. On the basis of a 50-year site curve, the mean site index is 111 for Douglas fir and 100 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 218 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 150 cubic feet at age 60. Among the trees of limited extent are red alder, bigleaf maple, and western redcedar.

The main limitations for harvesting timber are stones on the surface and seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round. Rock for road construction is readily available in this unit. Stones on the surface hinder harvesting and can cause breakage of timber. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, salal, western hazel, Oregongrape, trailing blackberry, western swordfern, Oregon oxalis, and deerfoot vanillaleaf.

This unit is suited to use as hayland and pastureland. The main limitations are steepness of slope, the hazard of erosion, and large stones in and on the surface layer. Erosion can be controlled by growing pasture. The use of equipment is limited by stones on the surface and steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing twice a year helps to maintain uniform growth and discourages selective grazing.

This map unit is in capability subclass IVe.

111—Skoly stony loam, 30 to 65 percent slopes. This very deep, well drained soil is on mountain slopes. It formed in colluvium derived dominantly from basalt. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 2,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper 5 inches of the surface layer is dark brown stony loam, and the lower 12 inches is dark brown very cobbly loam. The subsoil is dark brown very cobbly loam 23 inches thick. The substratum to a depth of 60 inches or more is dark brown very cobbly loam.

Included in this unit are small areas of Aschoff, Steever, Zygore, and Mountzion soils. Also included are small areas of Skoly soils that have slopes of less than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Skoly soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 144 for Douglas fir and 140 for western hemlock. On the basis of a 50-year site curve, the mean site index is 111 for Douglas fir and 100 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 218 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 150 cubic feet at age 60. Among the trees of limited extent are red alder, bigleaf maple, and western redcedar.

The main limitation for harvesting timber is steepness of slope. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Stones on the surface hinder harvesting and can cause breakage of timber. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, salal, western hazel, Oregongrape, trailing blackberry, western swordfern, Oregon oxalis, and deerfoot vanillaleaf.

This map unit is in capability subclass VIIe.

112—Skoly-Rock outcrop complex, 5 to 30 percent slopes. This map unit is on mountain slopes. The native vegetation is mainly mixed conifers and shrubs. Elevation is 600 to 2,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 110 to 160 days.

This unit is about 60 percent Skoly stony loam, 5 to 30 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Aschoff, Steever, and Zygore soils. Also included are small areas of shallow soils and talus slopes, mainly adjacent to the Rock outcrop. Included areas make up about 10 percent of the total acreage.

The Skoly soil is very deep and well drained. It formed in colluvium derived dominantly from basalt. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is dark brown stony loam 5 inches thick, and the lower part is very cobbly loam 12 inches thick. The subsoil is dark brown very cobbly loam 23 inches thick. The substratum to a depth of 60 inches or more is dark brown very cobbly loam.

Permeability of this Skoly soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Rock outcrop consists of exposed areas of dominantly basalt. Numerous escarpments are in this unit.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir and western hemlock are the main woodland species on the Skoly soil. On the basis of a 100-year site curve, the mean site index is 144 for Douglas fir and 140 for western hemlock. On the basis of a 50-year site curve, the mean site index is 111 for Douglas fir and 100 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 218 cubic feet per acre per year at age 60, and the CMAI for Douglas fir is 150 cubic feet at age 60. The areas of Rock outcrop make up about 30 percent of this unit and reduce yield accordingly. Among the trees of limited extent are red alder, bigleaf maple, and western redcedar.

The main limitations for harvesting timber are the areas of Rock outcrop and seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. The areas of Rock outcrop limit the even distribution of reforestation. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, salal, western hazel, Oregongrape, trailing blackberry, western swordfern, Oregon oxalis, and deerfoot vanillaleaf.

The Skoly soil is in capability subclass IVe, and the Rock outcrop is in capability subclass VIIIs.

113—Skoly-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on mountain slopes.

The native vegetation is mainly mixed conifers and shrubs. Elevation is 600 to 2,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 110 to 160 days.

This unit is about 50 percent Skoly stony loam, 30 to 60 percent slopes, and 40 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Aschoff, Steever, and Zygore soils. Also included are small areas of shallow soils and talus slopes, mainly adjacent to the Rock outcrop. Included areas make up about 10 percent of the total acreage.

The Skoly soil is very deep and well drained. It formed in colluvium derived dominantly from basalt. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is dark brown stony loam 5 inches thick, and the lower part is very cobbly loam 12 inches thick. The subsoil is dark brown very cobbly loam 23 inches thick. The substratum to a depth of 60 inches or more is dark brown very cobbly loam.

Permeability of this Skoly soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists of exposed areas of dominantly basalt. Numerous escarpments are in this unit.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir and western hemlock are the main woodland species on the Skoly soil. On the basis of a 100-year site curve, the mean site index is 144 for Douglas fir and 140 for western hemlock. On the basis of a 50-year site curve, the mean site index is 111 for Douglas fir and 100 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 218 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 150 cubic feet at age 60. The areas of Rock outcrop make up about 40 percent of this unit and reduce yield accordingly. Among the trees of limited extent are red alder, bigleaf maple, and western redcedar.

The main limitations for harvesting timber are steepness of slope and the areas of Rock outcrop. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the s and damages the roots of trees. Rock outcrop may cause breakage of timber when felled and can hinde yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construc is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes tha have been cut or filled reduces erosion. Steep yardin paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If see trees are present, natural reforestation of cutover are by western hemlock and red alder occurs readily. The areas of Rock outcrop limit the even distribution of reforestation. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are v maple, red huckleberry, salal, western hazel, Oregongrape, trailing blackberry, western swordfern, Oregon oxalis, and deerfoot vanillaleaf.

The Skoly soil is in capability subclass VIIe, and th Rock outcrop is in capability subclass VIIIs.

114—St. Helens sandy loam, 0 to 30 percent slopes. This very deep, well drained soil is on terrace It formed in aerially deposited volcanic ash and pumic over pyroclastic flow and lahar. The native vegetation mainly mixed conifers and shrubs. Elevation is 1,600 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is ab 44 degrees F, and the average frost-free period is 90 110 days.

Where mixed to a depth of 6 inches, the surface layer is very dark brown sandy loam. The upper 3 inches of the subsoil is light brownish gray extremely cindery loamy sand, the next 9 inches is dark brown sandy loam, and the lower 10 inches is dark grayish brown sand. The substratum to a depth of 60 inches more is dark grayish brown very gravelly coarse sand

Included in this unit are small areas of Forsyth, Pinchot, Polepatch, and Shoestring soils. Also include are small areas of Bannel soils on mountain slopes a

St. Helens soils that have slopes of more than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this St. Helens soil is moderate in the subsoil and rapid in the substratum. Available water capacity is moderate. Effective rooting depth is 20 to 35 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 128 for Douglas fir and is estimated to be 127 for western hemlock. On the basis of a 50-year site curve, the mean site index is 102 for Douglas fir and is estimated to be 90 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 127 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 194 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and western white pine.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees are occasionally subject to windthrow.

Among the common forest understory plants are salal, western brackenfern, willow, trailing blackberry, red huckleberry, and pearly everlasting.

This map unit is in capability subclass IVe.

115—St. Martin gravelly silty clay loam, 2 to 15 percent slopes. This very deep, moderately well drained soil is on toe slopes of mountains that have been disturbed by landsliding. It formed in colluvium derived dominantly from andesite. The native vegetation is mainly mixed conifers and shrubs. Elevation is 300 to 2,000 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is black gravelly silty clay loam 4 inches thick. The upper 7 inches of the subsoil is very dark grayish brown silty clay loam, and the lower part to a depth of 60 inches or more is light olive brown and light yellowish brown clay.

Included in this unit are small areas of Aschoff, McElroy, and Stevenson soils on mountain slopes. Also included are small areas of cold soils and soils that are less than 35 percent clay. Included areas make up about 10 percent of the total acreage.

Permeability of this St. Martin soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight to moderate. A seasonal high water table is at a depth of 1 to 2 feet in December to April.

Most areas of this unit are used as woodland and wildlife habitat. A few areas are used as homesites.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 154 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 114. The culmination of the mean annual increment (CMAI) for Douglas fir is 163 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are grand fir, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Following road construction and clearcutting, road failures and landslides can occur. The seasonal high water table limits the use of equipment to dry periods in summer and fall. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings unless controlled. The seasonal high water table reduces root respiration, which results in a low survival rate of seedlings. Because the rooting depth is restricted by a high water table, trees frequently are subject to windthrow.

Among the common forest understory plants are vine maple, salal, common snowberry, dwarf rose, western hazel, honeysuckle, creambush oceanspray, trailing blackberry, and western swordfern.

The main limitations of this unit for use as homesites are the seasonal high water table, low soil strength, and the potential for shrinking and swelling. Preserving the existing plant cover during construction helps to control erosion. Wetness can be reduced by installing drain tile around footings. Excess water can be removed by using suitably designed drainage ditches. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Septic tank absorption fields do not function properly during rainy periods because of wetness and slow permeability. Use of sandy backfill for the trench and long absorption lines helps to compensate for the slow permeability. Because of wetness, effluent from septic tank absorption fields can surface and create a hazard to health. During the rainy season, effluent from onsite sewage disposal systems may seep at points downslope.

This map unit is in capability subclass IVe.

116—St. Martin gravelly silty clay loam, 15 to 30 percent slopes. This very deep, moderately well drained soil is on back slopes and toe slopes of mountains that have been disturbed by landslides. It formed in colluvium derived dominantly from andesite. The native vegetation is mainly mixed conifers and shrubs. Elevation is 300 to 2,000 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is black gravelly silty clay loam 4 inches thick. The upper 7 inches of the subsoil is very dark grayish brown silty clay loam, and the lower part to a depth of 60 inches or more is light olive brown and light yellowish brown clay.

Included in this unit are small areas of Aschoff, McElroy, and Stevenson soils on mountain slopes. Also included are small areas of cold soils and soils that are less than 35 percent clay. Included areas make up about 15 percent of the total acreage.

Permeability of this St. Martin soil is slow. Availab water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard o water erosion is moderate. A seasonal high water tab is at a depth of 1 to 2 feet from December to April.

This unit is used for woodland, wildlife habitat, and watershed.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 154 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 114. The culmination of the mean annual increment (CMAI) for Douglas fir is 163 cubic feet pe acre per year at age 60. Estimates of the site index CMAI for red alder have not been made. Among the trees of limited extent are grand fir, western redceda and bigleaf maple.

The main limitation for harvesting timber is seaso soil wetness. Use of wheeled and tracked equipmen when the soil is moist produces ruts, compacts the s and damages the roots of trees. Unsurfaced roads a skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing f year-round use. Rock for road construction is not readily available in this unit. Following road construc and clearcutting, road failures and landslides can occ A seasonal high water table limits the use of equipme to dry periods in summer and fall. Disturbance of the protective layer of duff can be reduced with the caref use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If se trees are present, natural reforestation of cutover are by red alder occurs readily. If the canopy is opened brush invades and can prevent the establishment of Douglas fir seedlings unless controlled. Because the rooting depth is restricted by the seasonal high wate table, trees frequently are subject to windthrow.

Among the common forest understory plants are v maple, salal, common snowberry, dwarf rose, wester hazel, honeysuckle, creambush oceanspray, trailing blackberry, and western swordfern.

This map unit is in capability subclass VIc.

117—St. Martin gravelly silty clay loam, 30 to 65 percent slopes. This very deep, moderately well drained soil is on back slopes of mountains that hav been disturbed by landslides. It formed in colluvium derived dominantly from andesite. The native vegeta is mainly mixed conifers and shrubs. Elevation is 300 to 2,000 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is black gravelly silty clay loam 4 inches thick. The upper 7 inches of the subsoil is very dark grayish brown silty clay loam, and the lower part to a depth of 60 inches or more is light olive brown and light yellowish brown clay.

Included in this unit are small areas of Aschoff, McElroy, Stevenson, and Timberhead soils on mountain slopes. Also included are small areas of cold soils, soils that are less than 35 percent clay, and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this St. Martin soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. A seasonal high water table is at a depth of 1 to 2 feet from December to April.

This unit is used for woodland, wildlife habitat, and watershed.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 154 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 114. The culmination of the mean annual increment (CMAI) for Douglas fir is 163 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are grand fir, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. A seasonal high water table limits the use of equipment to dry periods in summer and fall. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings unless controlled. The seasonal high water table reduces root respiration, which results in a low survival rate of seedlings. Because the rooting depth is restricted by the seasonal high water table, trees frequently are subject to windthrow.

Among the common forest understory plants are vine maple, salal, common snowberry, dwarf rose, western hazel, honeysuckle, creambush oceanspray, trailing blackberry, and western swordfern.

This map unit is in capability subclass VIc.

118—St. Martin gravelly silty clay loam, slumped, 2 to 30 percent slopes. This very deep, moderately well drained soil is on foot slopes of mountains that have been disturbed by landslides. It formed in colluvium derived dominantly from andesite. The native vegetation is mainly mixed conifers and shrubs. Elevation is 300 to 1,600 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is black gravelly silty clay loam 4 inches thick. The upper 7 inches of the subsoil is very dark grayish brown silty clay loam, and the lower part to a depth of 60 inches or more is light olive brown and light yellowish brown clay.

Included in this unit are small areas of Steever and Stevenson soils on mountain slopes. Also included are small areas of poorly drained soils in depressional areas. Included areas make up about 10 percent of the total acreage.

Permeability of this St. Martin soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. A seasonal high water table is at a depth of 1 to 2 feet from December to April.

Most areas of this unit are used for wildlife habitat. A few areas are used as homesites and woodland.

Douglas fir and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 105 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 80. The culmination of the mean annual increment (CMAI) for Douglas fir is 91 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are grand fir, western redcedar, and bigleaf maple.

The main limitations for harvesting timber are seasonal soil wetness and hummocky terrain. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Following road construction and clearcutting, road failures and landslides are common. Frequent road maintenance is necessary on this unit. The seasonal high water table limits the use of equipment to dry periods in summer and fall.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. The wet depressional areas limit the even distribution of reforestation. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings unless controlled. The seasonal high water table reduces root respiration, which results in a low survival rate of seedlings. Because the rooting depth is restricted by the seasonal high water table, trees frequently are subject to windthrow.

Among the common forest understory plants are vine maple, salal, common snowberry, dwarf rose, western hazel, orange honeysuckle, creambush oceanspray, trailing blackberry, and western swordfern.

The main limitations of this unit for use as homesites are slow permeability, steepness of slope, low soil strength, the seasonal high water table, the potential for shrinking and swelling, and the instability of the soil. Preserving the existing plant cover during construction helps to control erosion. Wetness can be reduced by installing drain tile around footings. Excess water can be removed by using suitably designed drainage ditches. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Septic tank absorption fields do not function properly during rainy periods because of wetness and the slow permeability. Use of sandy backfill for the trench and long absorption lines helps to compensate for the slow permeability. Dikes and channels that have outlets to bypass floodwater can be used to protect buildings and onsite sewage disposal systems from flooding. During the rainy season, effluent from onsite sewage disposal systems may seep at points downslope. The effects of shrinking and swelling can b minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. The soil is susceptible to slippage, which ma damage building foundations and roads.

This map unit is in capability subclass VIe.

119—Stabbart clay loam. This very deep, somewha poorly drained soil is on toe slopes and alluvial fans. It formed in alluvium derived dominantly from igneous rock. Slope is 0 to 3 percent. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,200 feet. The average annual precipitation is about 9 inches, the average annual air temperature is about 4 degrees F, and the average frost-free period is 115 to 135 days.

Typically, the surface layer is dark brown clay loam 13 inches thick. The upper 16 inches of the subsoil is dark brown clay loam, and the lower 8 inches is light yellowish brown silty clay loam. The substratum to a depth of 60 inches or more is light yellowish brown cla loam.

Included in this unit are small areas of Stabler soils on terraces and St. Martin soils on landslides. Also included are small areas of moderately well drained ar poorly drained soils and a few areas of soils adjacent streams that are subject to flooding. Included areas make up about 10 percent of the total acreage.

Permeability of this Stabbart soil is moderately slow Available water capacity is high. Effective rooting dep is 60 inches or more. Runoff is slow, and the hazard o water erosion is slight. A seasonal high water table is a depth of 0.5 to 1.0 foot from January to May.

This unit is used as woodland, homesites, and wildlife habitat.

Douglas fir and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 139 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 107. The culmination of the mean annual increment (CMAI) for Douglas fir is 144 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for grand fir have not been made. Among the trees of limited extent are red alder, bigleaf maple, and western redcedar.

The main limitation for harvesting timber is seasona soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the so and damages the roots of trees. Unsurfaced roads an skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. The seasonal high water table limits the use of equipment to dry periods in summer and fall. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily and by grand fir, periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by grand fir unless controlled. The seasonal high water table reduces root respiration, which results in a low survival rate of seedlings. Because the rooting depth is restricted by the seasonal high water table, trees frequently are subject to windthrow.

Among the common forest understory plants are vine maple, orange honeysuckle, dogbane, Pacific dogwood, western hazel, thimbleberry, Oregongrape, and trailing blackberry.

This unit is poorly suited to homesite development. The main limitations are low soil strength, the seasonal high water table, and moderately slow permeability. Buildings and roads should be designed to offset the limited ability of the soil to support a load. Wetness can be reduced by installing drain tile around footings. Excess water can be removed by using suitably designed drainage ditches. Selection of adapted vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Septic tank absorption fields do not function properly during rainy periods because of wetness and the moderately slow permeability. Use of sandy backfill for the trench and long absorption lines helps to compensate for the moderately slow permeability.

This map unit is in capability subclass IVw.

120—Stabler loam, 0 to 8 percent slopes. This very deep, well drained soil is on terraces. It formed in pyroclastic flows of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 600 to 1,600 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown and dark yellowish brown loam 9 inches thick. The subsoil is dark yellowish brown loam 28 inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown sandy loam.

Included in this unit are small areas of Skamania soils, St. Martin soils on landslides, and Stevenson soils on mountain slopes. Also included are small areas of somewhat poorly drained soils and Stabler soils that have slopes of more than 8 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Stabler soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, pastureland, tree seedling nurseries, homesites, wildlife habitat, and recreation.

Douglas fir, western hemlock, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 141 for Douglas fir and 133 for western hemlock. On the basis of a 50-year site curve, the mean site index is 106 for Douglas fir and 95 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 146 cubic feet per acre per year at age 65, and the CMAI for western hemlock is 205 cubic feet at age 50. Estimates of the site index or CMAI for grand fir have not been made. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable during rainy periods. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled.

Among the common forest understory plants are vine maple, serviceberry, Oregongrape, Pacific dogwood, salal, common snowberry, red huckleberry, and trailing blackberry.

This unit is well suited to use as pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

This unit is well suited to use as homesites. It has few limitations. Preserving the existing plant cover during construction helps to control erosion. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. The soil in this unit is subject to frost action, which may limit construction of roads and streets.

This map unit is in capability subclass IIe.

121—Stabler loam, 8 to 30 percent slopes. This very deep, well drained soil is on terraces and back slopes. It formed in pyroclastic flows of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 600 to 1,600 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown and dark yellowish brown loam 9 inches thick. The subsoil is dark yellowish brown loam 28 inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown sandy loam.

Included in this unit are small areas of Aschoff and Stevenson soils, St. Martin soils on landslides, and Skamania soils on terraces. Also included are small areas of stony soils that are shallow to bedrock and Stabler soils that have slopes of less than 8 percent or more than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Stabler soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, wildlife habitat, and recreation.

Douglas fir, western hemlock, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 141 for Douglas fir and 133 for western hemlock. On the basis of a 50-year site curve, the mean site index is 106 for Douglas fir and 95 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 146 cubic feet per acre per year at age 65, and the CMAI for western hemlock is 205 cubic feet at age 50. Estimates of the site index or CMAI for gra fir have not been made. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is seasona soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the so and damages the roots of trees. Unsurfaced roads an skid trails are soft and slippery and can be impassabl when wet. Logging roads require suitable surfacing fo year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the carefu use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If see trees are present, natural reforestation of cutover area by western hemlock and grand fir occurs periodically. the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled.

Among the common forest understory plants are vin maple, serviceberry, Oregongrape, Pacific dogwood, salal, common snowberry, red huckleberry, and trailin blackberry.

This map unit is in capability subclass IVe.

122—Stabler loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes. It forme in volcanic flows of volcanic ash and pumice. The nat vegetation is mainly mixed conifers and shrubs. Elevation is 1,000 to 1,600 feet. The average annual precipitation is about 80 inches, the average annual a temperature is about 46 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thic The surface layer is dark brown and dark yellowish brown loam 9 inches thick. The subsoil is dark yellowis brown loam 28 inches thick. The substratum to a dept of 60 inches or more is dark yellowish brown sandy loam.

Included in this unit are small areas of Aschoff, McElroy, and St. Martin soils on landslides. Also included are small areas of basalt Rock outcrop and shallow soils. Included areas make up about 7 percen of the total acreage.

Permeability of this Stabler soil is moderate. Available water capacity is high. Effective rooting dept is 60 inches or more. Runoff is rapid, and the hazard water erosion is severe.

This unit is used for woodland, wildlife habitat, and recreation.

Douglas fir, western hemlock, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 141 for Douglas fir and 133 for western hemlock. On the basis of a 50-year site curve, the mean site index is 106 for Douglas fir and 95 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 146 cubic feet per acre per year at age 65, and the CMAI for western hemlock is 205 cubic feet at age 50. Estimates of the site index or CMAI for grand fir have not been made. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitations for harvesting timber are steepness of slope and the hazard of erosion. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled.

Among the common forest understory plants are vine maple, serviceberry, Oregongrape, Pacific dogwood, salal, common snowberry, red huckleberry, and trailing blackberry.

This map unit is in capability subclass VIIe.

123—Steever stony clay loam, 2 to 30 percent slopes. This very deep, well drained soil is on toe slopes and foot slopes. It formed in colluvial landslide material derived dominantly from basalt, andesite, and conglomerate. The native vegetation is mainly mixed conifers and shrubs. Elevation is 50 to 1,500 feet. The average annual precipitation is about 75 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 110 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark brown stony clay loam 5 inches thick, and the lower part is dark brown gravelly clay loam 7 inches thick. The upper 8 inches of the subsoil is dark brown very gravelly clay loam, and the lower 10 inches is dark brown very gravelly loam. The substratum to a depth of 60 inches or more is dark brown very gravelly loam.

Included in this unit are small areas of Aschoff, Mountzion, and Stevenson soils that are more stable than this Steever soil and areas of Skamania soils on terraces. Also included are small areas of Skoly soils, poorly drained soils, and Steever soils that have slopes of more than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Steever soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for woodland, wildlife habitat, recreation, and watershed. A few areas are used as homesites and pastureland.

Douglas fir, western hemlock, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 131 for Douglas fir and 127 for western hemlock. On the basis of a 50-year site curve, the mean site index is 100 for Douglas fir and 90 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 132 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 194 cubic feet at age 50. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are grand fir and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Oregongrape, red huckleberry, trailing blackberry, creambush oceanspray, western hazel, Pacific dogwood, common snowberry, thimbleberry, and dwarf rose.

The main limitation of this unit for use as homesites is the steepness of slope. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Steepness of slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This unit has few limitations for use as pastureland. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing. In some years, supplemental irrigation is needed.

This map unit is in capability subclass IVe.

124—Steever stony clay loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes. It formed in colluvial landslide material derived dominantly from basalt, andesite, and conglomerate. The native vegetation is mainly mixed conifers and shrubs. Elevation is 50 to 1,500 feet. The average annual precipitation is about 75 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 100 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark brown stony clay loam 5 inches thick, and the lower part is dark brown gravelly clay loam 7 inches thick. The upper 8 inches of the subsoil is dark brown very gravelly clay loam, and the lower 10 inches is dark brown very gravelly loam. The substratum to a depth of 60 inches or more is dark brown very gravelly loam.

Included in this unit are small areas of Aschoff, Mountzion, and Stevenson soils that are more stable than this Steever soil and Skamania soils on terraces. Also included are small areas of shallow soils, Rock outcrop, and Steever soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Steever soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir, western hemlock, and red alder are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 131 for Douglas fir and 127 for western hemlock. On the basis of a 50-year site curve, the mean site index is 100 for Douglas fir and 90 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 132 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 194 cubic feet at age 50. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are grand fir and bigleaf maple.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Oregongrape, red huckleberry, trailing blackberry, creambush oceanspray, western hazel, Pacific dogwood, common snowberry, thimbleberry, and dwarf rose.

This map unit is in capability subclass VIIe.

125—Steever-Rock outcrop complex, 2 to 30 percent slopes. This map unit is on toe slopes and foot slopes. The native vegetation is mainly mixed conifers and shrubs. Elevation is 50 to 1,500 feet. The average annual precipitation is about 75 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 100 to 160 days.

This unit is about 45 percent Steever stony clay loam, 2 to 30 percent slopes, and 40 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Aschoff, Skoly, and Stevenson soils. Also included are small areas of poorly drained soils, shallow soils, and Steever soils that have slopes of more than 30 percent. Included areas make up about 15 percent of the total acreage.

The Steever soil is very deep and well drained. It formed in colluvial landslide material derived from basalt, andesite, and conglomerate. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark brown stony clay loam 5 inches thick, and the lower part is dark brown gravelly clay loam 7 inches thick. The upper 8 inches of the subsoil is dark brown very gravelly clay loam, and the lower 10 inches is dark brown very gravelly loam. The substratum to a depth of 60 inches or more is dark brown very gravelly loam.

Permeability of this Steever soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Rock outcrop consists of exposed areas of dominantly basalt, andesite, and conglomerate. Numerous escarpments are in this unit.

This unit is used for wildlife habitat, recreation, watershed, and woodland.

Douglas fir, western hemlock, and red alder are the main woodland species on the Steever soil. On the basis of a 100-year site curve, the mean site index is 131 for Douglas fir and 127 for western hemlock. On the basis of a 50-year site curve, the mean site index is 100 for Douglas fir and 90 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 132 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 194 cubic feet at age 50. The areas of Rock outcrop make up about 40 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are grand fir and bigleaf maple.

The main limitations for harvesting timber are seasonal soil wetness and the areas of Rock outcrop. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. The areas of Rock outcrop limit the even distribution of reforestation. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock.

Among the common forest understory plants are vine maple, Oregongrape, red huckleberry, trailing blackberry, creambush oceanspray, western hazel, Pacific dogwood, common snowberry, thimbleberry, and dwarf rose.

The Steever soil is in capability subclass IVe, and the Rock outcrop is in capability subclass VIIIs.

126—Steever-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on back slopes. The native vegetation is mainly mixed conifers and shrubs. Elevation is 50 to 1,500 feet. The average annual precipitation is about 75 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 100 to 160 days.

This unit is about 45 percent Steever stony clay loam, 30 to 65 percent slopes, and 40 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Aschoff, Skoly, and Stevenson soils. Also included are small areas of poorly drained soils and Steever soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

The Steever soil is very deep and well drained. It formed in colluvial landslide material derived dominantly from basalt, andesite, and conglomerate. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper part of the surface layer is very dark brown stony clay loam 5 inches thick, and the lower part is dark brown gravelly clay loam 7 inches thick. The upper 8 inches of the subsoil is dark brown very gravelly clay loam, and the lower 10 inches is dark brown very gravelly loam. The substratum to a depth of 60 inches or more is dark brown very gravelly loam.

Permeability of this Steever soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists of exposed areas of mainly basalt, andesite, and conglomerate. Numerous escarpments are in this unit.

Most areas of this unit are used for wildlife habitat, recreation, and watershed. A few areas are used as woodland.

Douglas fir, western hemlock, and red alder are the main woodland species on the Steever soil. On the basis of a 100-year site curve, the mean site index is 131 for Douglas fir and 127 for western hemlock. On the basis of a 50-year site curve, the mean site index is 100 for Douglas fir and 90 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 132 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 194 cubic feet at age 50. The areas of Rock outcrop make up about 40 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for red alder have not been made. Among the trees of limited extent are grand fir and bigleaf maple.

The main limitations for harvesting timber are the areas of Rock outcrop and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and red alder occurs readily. The areas of Rock outcrop limit the even distribution of reforestation. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, Oregongrape, red huckleberry, trailing blackberry, creambush oceanspray, western hazel, Pacific dogwood, common snowberry, thimbleberry, and dwarf rose.

The Steever soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

127—Stevenson loam, 2 to 15 percent slopes. This very deep, well drained soil is on toe slopes and foot slopes of mountains. Areas generally are hummocky. The soil formed in colluvial landslide material derived dominantly from basalt, andesite, and conglomerate. The native vegetation is mainly mixed conifers and shrubs. Elevation is 100 to 1,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 110 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 11 inches thick. The upper 17 inches of the subsoil is dark brown loam, and the lower 9 inches is dark yellowish brown loam. The substratum to a depth of 60 inches or more is dark yellowish brown loam.

Included in this unit are small areas of St. Martin and Steever soils in areas of colluvial landslide material and Skamania and Stabler soils on terraces. Also included are small areas of Stevenson soils that have slopes of more than 15 percent and somewhat poorly drained soils in depressional areas. Included areas make up about 10 percent of the total acreage.

Permeability of this Stevenson soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for urban development, hayland, pastureland, woodland, wildlife habitat, and recreation.

The main limitations of this unit for urban development are steepness of slope, the hazard of erosion, shrink-swell potential, and low soil strength. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs. The moderate permeability and steepness of slope increase the possibility of failure of septic tank absorption fields. During the rainy season, effluent from onsite sewage disposal systems may seep at points downslope.

Douglas fir, western hemlock, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 154 for Douglas fir and 148 for western hemlock. On the basis of a 50-year site curve, the mean site index is 114 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 163 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 234 cubic feet at age 50. Estimates of the site index or CMAI for grand fir have not been made. Among the trees of limited extent are western redcedar, bigleaf maple, and red alder.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, honeysuckle, bitter cherry, common snowberry, creambush oceanspray, Oregongrape, dwarf rose, and western brackenfern.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

This map unit is in capability subclass IIIe.

128—Stevenson loam, 15 to 30 percent slopes. This very deep, well drained soil is on foot slopes and back slopes of mountains. Areas generally are hummocky. The soil formed in colluvial landslide material derived from basalt, andesite, and conglomerate. The native vegetation is mainly mixed conifers and shrubs. Elevation is 100 to 1,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 110 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 11 inches thick. The upper 17 inches of the subsoil is dark brown loam, and the lower 9 inches is dark yellowish brown loam. The substratum to a depth of 60 inches or more is dark yellowish brown loam.

Included in this unit are small areas of St. Martin and Steever soils in areas of landslide material and Skamania and Stabler soils on terraces. Also included are small areas of Stevenson soils that have slopes of less than 15 percent or more than 30 percent and somewhat poorly drained soils in depressional areas. Included areas make up about 10 percent of the total acreage.

Permeability of this Stevenson soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for urban development, woodland, hayland, pastureland, wildlife habitat, and recreation.

The main limitations for urban development are steepness of slope, the hazard of erosion, shrink-swell potential, and low soil strength. The hazard of erosion is increased if the soil is left exposed during site development. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. During the rainy season, effluent from onsite sewage disposal systems may seep at points downslope.

Douglas fir, western hemlock, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 154 for Douglas fir and 148 for western hemlock. On the basis of a 50-year site curve, the mean site index is 108 for Douglas fir and 105 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 163 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 234 cubic feet at age 50. Estimates of the site index or CMAI for grand fir have not been made. Among the trees of limited extent are western redcedar, bigleaf maple, and red alder.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, orange honeysuckle, bitter cherry, common snowberry, creambush oceanspray, Oregongrape, dwarf rose, and western brackenfern.

This unit is well suited to use as hayland and pastureland. The main limitations are steepness of slope and the hazard of erosion. Erosion can be controlled by growing pasture. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

This map unit is in capability subclass IVe.

129—Stevenson loam, 30 to 50 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in colluvial landslide material derived dominantly from basalt, andesite, and conglomerate. The native vegetation is mainly mixed conifers and shrubs. Elevation is 100 to 1,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is 110 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 11 inches thick. The upper 17 inches of the subsoil is dark brown loam, and the lower 9 inches is dark yellowish brown loam. The substratum to a depth of 60 inches or more is dark yellowish brown loam.

Included in this unit are small areas of Steever and St. Martin soils in areas of landslide material. Also included are small areas of Stevenson soils that have slopes of less than 30 percent or more than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Stevenson soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, watershed, wildlife habitat, and recreation.

Douglas fir, western hemlock, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 132 for Douglas fir and 127 for western hemlock. On the basis of a 50-year site curve, the mean site index is 100 for Douglas fir and 90 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 133 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 194 cubic feet at age 50. Estimates of the site index or CMAI for grand fir have not been made. Among the trees of limited extent are western redcedar, bigleaf maple, and red alder.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and sticky and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, orange honeysuckle, bitter cherry, common snowberry, creambush oceanspray, Oregongrape, dwarf rose, and western brackenfern.

This map unit is in capability subclass VIIe.

130—Swift cindery sandy loam, 2 to 30 percent slopes. This very deep, well drained soil is on side slopes and ridgetops of mountains. It formed in colluvium derived dominantly from volcanic ash and basic igneous rock with a mantle of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,200 to 2,800 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown cindery sandy loam 12 inches thick. The upper 15 inches of the subsoil is dark yellowish brown very cindery loam, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Included in this unit are small areas of Cinnamon, Hatchet, Lonestar, and Vanson soils and St. Helens and Yalelake soils on terraces. Also included are small areas of Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Swift soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 129 for Douglas fir and 119 for western hemlock. On the basis of a 50-year site curve, the mean site index is 96 for Douglas fir and 83 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 128 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 178 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically.

Among the common forest understory plants are vine maple, red huckleberry, trailing blackberry, false Solomons seal, deerfoot vanillaleaf, western brackenfern, and starflower.

This map unit is in capability subclass IVe.

131—Swift cindery sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on side slopes of mountains. It formed in colluvium derived dominantly from volcanic ash and basic igneous rock with a mantle of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,200 to 2,800 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown cindery sandy loam 12 inches thick. The upper 15 inches of the subsoil is dark yellowish brown very cindery loam, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Included in this unit are small areas of Cinnamon, Hatchet, Lonestar, and Vanson soils and Yalelake soils on terraces. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Swift soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 129 for Douglas fir and 119 for western hemlock. On the basis of a 50-year site curve, the mean site index is 96 for Douglas fir and 83 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 128 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 178 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Cinders slough from road cuts onto the road. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically.

Among the common forest understory plants are vine maple, red huckleberry, trailing blackberry, false Solomons seal, deerfoot vanillaleaf, western brackenfern, and starflower.

This map unit is in capability subclass VIIe.

132—Swift cindery sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on side slopes of mountains. It formed in colluvium derived from volcanic ash and basic igneous rock with a mantle of volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,200 to 2,800 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown cindery sandy loam 12 inches thick. The upper 15 inches of the subsoil is dark yellowish brown very cindery loam, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Included in this unit are small areas of Cinnamon, Hatchet, Lonestar, and Vanson soils and Yalelake soils on terraces. Also included are small areas of Rock outcrop and Swift soils that are less than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Swift soil is moderately high. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard o water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 129 for Douglas fir and 119 for western hemlock. On the basis of a 50-year site curve, the mean site index is 96 for Douglas fir and 83 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 128 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 178 cubic fee at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Construction and maintenance costs are higher for roads on the steeper slopes. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically.

Among the common forest understory plants are vine maple, red huckleberry, trailing blackberry, false Solomons seal, deerfoot vanillaleaf, western brackenfern, and starflower.

This map unit is in capability subclass VIIe.

133—Swift-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on side slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,200 to 2,800 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 100 to 120 days.

This unit is about 65 percent Swift cindery sandy loam, 30 to 65 percent slopes, and 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Hatchet and Vanson soils. Also included are small areas of Cinnamon soils. Included areas make up about 10 percent of the total acreage.

The Swift soil is very deep and well drained. It formed in colluvium derived dominantly from volcanic ash and basic igneous rock with a mantle of volcanic ash and pumice. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown cindery sandy loam 12 inches thick. The upper 15 inches of the subsoil is dark yellowish brown very cindery loam, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Permeability of this Swift soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Rock outcrop consists of exposed areas of dominantly andesite and basalt. Numerous escarpments are in this unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on the Swift soil. On the basis of a 100-year site curve, the mean site index is 129 for Douglas fir and 119 for western hemlock. On the basis of a 50-year site curve, the mean site index is 96 for Douglas fir and 83 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 128 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 178 cubic feet at age 50. The areas of Rock outcrop make up about 25 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitations for harvesting timber are steepness of slope and the areas of Rock outcrop. Steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. The areas of Rock outcrop limit the even distribution of reforestation.

Among the common forest understory plants are vine maple, red huckleberry, trailing blackberry, false Solomons seal, deerfoot vanillaleaf, western brackenfern, and starflower.

The Swift soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

134—Swift-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on side slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,200 to 2,800 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 100 to 120 days.

This unit is about 60 percent Swift cindery sandy loam, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Hatchet and Vanson soils. Also included are small areas of Cinnamon soils. Included areas make up about 10 percent of the total acreage.

The Swift soil is very deep and well drained. It formed in colluvium derived dominantly from volcanic ash and basic igneous rock with a mantle of volcanic ash and pumice. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown cindery sandy loam 12 inches thick. The upper 15 inches of the subsoil is dark yellowish brown very cindery loam, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Permeability of this Swift soil is moderately high. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists of exposed areas of dominantly andesite and basalt. Numerous escarpments are in this unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir, western hemlock, and Pacific silver fir are the main woodland species on the Swift soil. On the basis of a 100-year site curve, the mean site index is 129 for Douglas fir and 119 for western hemlock. On the basis of a 50-year site curve, the mean site index is 96 for Douglas fir and 83 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 128 cubic feet per acre per year at age 70, and the CMAI for western hemlock is 178 cubic feet at age 50. The areas of Rock outcrop make up about 30 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are western redcedar and red alder.

The main limitations for harvesting timber are steepness of slope and the areas of Rock outcrop. Cable yarding systems generally are used on this unit. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natura reforestation of cutover areas by western hemlock an Pacific silver fir occurs periodically. The areas of Roc outcrop limit the even distribution of reforestation.

Among the common forest understory plants are vi maple, red huckleberry, trailing blackberry, false Solomons seal, deerfoot vanillaleaf, western brackenfern, and starflower.

The Swift soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

135—Timberhead gravelly loam, 5 to 30 percent slopes. This very deep, well drained soil is on ridgeto of mountains. It formed in residuum and colluvium derived dominantly from basalt with a mantle of volca ash. The native vegetation is mainly mixed conifers a shrubs. Elevation is 2,000 to 2,800 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 95 to 115 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thic The surface layer is dark brown gravelly loam 10 inch thick. The subsoil is dark brown gravelly loam 30 inch thick. The substratum to a depth of 60 inches or more dark brown loam.

Included in this unit are small areas of McElroy, Underwood, and Undusk soils. Also included are sma areas of shallow and moderately deep soils over basa Included areas make up about 10 percent of the total acreage.

Permeability of this Timberhead soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium and the hazard of water erosion is moderate.

Most areas of this unit are used for woodland, recreation, wildlife habitat, and watershed. A few area are used as grazeable woodland.

Douglas fir, grand fir, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 124 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 92. The culmination of the mea annual increment (CMAI) for Douglas fir is 121 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for grand fir and western hemlock have not been made. Among the trees of limited extent is western redcedar. Areas on ridgetops that are subjec to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is seaso soil wetness. Use of wheeled and tracked equipmen when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and grand fir occurs periodically. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes.

Among the common forest understory plants are vine maple, dwarf rose, common snowberry, thimbleberry, western raspberry, and princes pine.

Forage on this unit consists primarily of browse, forbs, and some grasses. Livestock grazing is limited by the density of the stand. Silvicultural practices such as clearcutting can result in temporary increases in available forage. The useful lifespan of interim forage is about 10 years.

This map unit is in capability subclass IVe.

136—Timberhead gravelly loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,000 to 2,800 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 95 to 115 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown gravelly loam 10 inches thick. The subsoil is dark brown gravelly loam 30 inches thick. The substratum to a depth of 60 inches or more is dark brown loam.

Included in this unit are small areas of McElroy, Underwood, and Undusk soils. Also included are small areas of Rock outcrop and moderately deep soils over basalt. Included areas make up about 15 percent of the total acreage.

Permeability of this Timberhead soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Most areas of this unit are used for woodland, recreation, wildlife habitat, and watershed. A few areas are used as grazeable woodland.

Douglas fir, grand fir, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 124 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 92. The culmination of the mean annual increment (CMAI) for Douglas fir is 121 cubic feet per acre per year at age 70. Estimates of the site index or CMAI for grand fir and western hemlock have not been made. Among the trees of limited extent is western redcedar.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and grand fir occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes.

Among the common forest understory plants are vine maple, dwarf rose, common snowberry, thimbleberry, western raspberry, and princes pine.

Forage on this unit consists primarily of browse, forbs, and some grasses. Livestock grazing is limited by the density of the stand and steepness of slope. Silvicultural practices such as clearcutting can result in temporary increases in available forage. The useful lifespan of interim forage is about 10 years.

This map unit is in capability subclass VIIe.

137—Tradedollar sandy loam, 0 to 30 percent slopes. This very deep, well drained soil is on ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam, and the lower 16 inches is dark brown extremely cindery loamy sand and strong brown extremely cindery sand. Below this is a buried surface layer of dark grayish brown cindery sandy loam 9 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of dark brown very gravelly sandy loam.

Included in this unit are small areas of Cattcreek, Colter, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid in the upper part of the subsoil and very rapid in the lower part and is moderately rapid in the buried subsoil. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Pacific silver fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 70. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are noble fir, Douglas fir, and western white pine. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto t road surface. Disturbance of the protective layer of du can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover area by western hemlock and Pacific silver fir occurs periodically. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and dela their establishment. The mortality rate of seedlings ar the hazard of windthrow are higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees frequently are subject to windthrow.

Among the common forest understory plants are Sitka alder, tall blue huckleberry, common beargrass, and violet.

This map unit is in capability subclass VIs.

138—Tradedollar sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 5,400 feet. The average annual precipitation is about 100 inches, the average annual air temperature is ab 38 degrees F, and the average frost-free period is 75 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thic The surface layer is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subs is dark brown cindery sandy loam, and the lower 16 inches is dark brown extremely cindery loamy sand a strong brown extremely cindery sand. The next layer a buried surface layer of dark grayish brown cindery sandy loam 9 inches thick. Below this to a depth of 6 inches or more is a buried subsoil of dark brown very gravelly sandy loam.

Included in this unit are small areas of Cattcreek, Colter, and Sinnice soils. Also included are small area of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid in the upper part of the subsoil and very rapid i the lower part and is moderately rapid in the buried subsoil. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Pacific silver fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 70. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are noble fir, Douglas fir, and western white pine.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, tall blue huckleberry, common beargrass, and violet.

This map unit is in capability subclass VIIe.

139—Tradedollar sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam, and the lower 16 inches is dark brown extremely cindery loamy sand and strong brown extremely cindery sand. Below this is a buried surface layer of dark grayish brown cindery sandy loam 9 inches thick. The next layer to a depth of 60 inches or more is a buried subsoil of dark brown very gravelly sandy loam.

Included in this unit are small areas of Cattcreek, Colter, and Sinnice soils. Also included are small areas of Rock outcrop and Tradedollar soils that are less than 40 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid in the upper part of the subsoil and very rapid in the lower part and is moderately rapid in the buried subsoil. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Pacific silver fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 70. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are noble fir, Douglas fir, and western white pine.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, tall blue huckleberry, common beargrass, and violet.

This map unit is in capability subclass VIIe.

140—Tradedollar sandy loam, warm, 0 to 30 percent slopes. This very deep, well drained soil is on ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam, and the lower 16 inches is dark brown extremely cindery loamy sand and strong brown extremely cindery sand. Below this is a buried surface layer of dark grayish brown cindery sandy loam 9 inches thick. The next layer to a depth of 60 inches or more is a buried subsoil of dark brown very gravelly sandy loam.

Included in this unit are small areas of Cattcreek, Colter, Minniepeak, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid in the upper part of the subsoil and very rapid in the lower part and is moderately rapid in the buried subsoil. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 120 for western hemlock and 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for western hemlock and 90 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock 180 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 110 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver have not been made. Among the trees of limited exte are noble fir and western redcedar. Areas on ridgeto that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpa in winter. Use of wheeled and tracked equipment whe the soil is moist produces ruts, compacts the soil, an damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto road surface. Disturbance of the protective layer of can be reduced with the careful use of wheeled and tracked equipment.

Reforestation can be accomplished by planting no fir and Douglas fir seedlings. If seed trees are prese natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Th mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities ca readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growt Trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, tall blue huckleberry, red huckleberry, common beargrass, and violet.

This map unit is in capability subclass VIs.

141—Tradedollar sandy loam, warm, 30 to 65 percent slopes. This very deep, well drained soil is back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annu precipitation is about 100 inches, the average annu temperature is about 39 degrees F, and the averag frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam, and the lower 16 inches is dark brown extremely cindery loamy sand and strong brown extremely cindery sand. Below this is a buried surface layer of dark grayish brown cindery sandy loam 9 inches thick. The next layer to a depth of 60 inches or more is a buried subsoil of dark brown very gravelly sandy loam.

Included in this unit are small areas of Cattcreek, Colter, Minniepeak, and Sinnice soils. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid in the upper part of the subsoil and very rapid in the lower part and is moderately rapid in the buried subsoil. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 120 for western hemlock and 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for western hemlock and 90 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 180 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 110 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, tall blue huckleberry, red huckleberry, common beargrass, and violet.

This map unit is in capability subclass VIIe.

142—Tradedollar sandy loam, warm, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam, and the lower 16 inches is dark brown extremely cindery loamy sand and strong brown extremely cindery sand. Below this is a buried surface layer of dark grayish brown cindery sandy loam 9 inches thick. The next layer to a depth of 60 inches or more is a buried subsoil of dark brown very gravelly sandy loam.

Included in this unit are small areas of Cattcreek, Colter, and Sinnice soils. Also included are small areas of Rock outcrop and Tradedollar soils that are 40 to 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid in the upper part of the subsoil and very rapid in the lower part and is moderately rapid in the buried subsoil. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 120 for western hemlock and 117 for Douglas fir. On the basis of a 50-year site curve, the mean site index is estimated to be 85 for western hemlock and 90 for Douglas fir. The culmination of the mean annual increment (CMAI) for western hemlock is 180 cubic feet per acre per year at age 50, and the CMAI for Douglas fir is 110 cubic feet at age 60. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent are noble fir and western redcedar.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Cinders slough from road cuts onto the road surface. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Reforestation can be accomplished by planting noble fir or Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Trees occasionally are subject to windthrow.

Among the common forest understory plants are Sitka alder, tall blue huckleberry, red huckleberry, common beargrass, and violet.

This map unit is in capability subclass VIIe.

143—Typic Dystrandepts, 5 to 65 percent slopes. These very deep, well drained soils are on cinder cones. They formed in volcanic material derived dominantly from volcanic ash, cinders, and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,400 to 2,500 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 110 to 130 days.

No single profile of Typic Dystrandepts is typical, but one commonly observed in the survey area has a surface layer of very dark brown loam 10 inches thic The subsoil is dark brown cobbly loam and very ston loam 31 inches thick. The substratum to a depth of 6 inches or more is dark brown cobbly loam.

Included in this unit are small areas of Kinney, Mountzion, and Skoly soils on mountain slopes. Included areas make up about 15 percent of the tota acreage.

Permeability of these Typic Dystrandepts is moderate. Available water capacity is moderately hig Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe.

This unit is used as woodland and wildlife habitat.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 144 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is estimated to be 110. The culmination of the mean annual increment (CMAI) for Douglas fir is 150 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for western hemlock have not been made. Among the trees of limited extent are grand fir and western redcedar.

The main limitation for harvesting timber is steepne of slope, which restricts the use of wheeled and tracke equipment in skidding. Cable yarding systems genera are safer and disturb the soil less. Use of wheeled ar tracked equipment when the soil is moist produces ru compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock fo road construction is not readily available in this unit. The surface layer is loose when dry, which limits the use of wheeled and tracked equipment. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir or noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs readily. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay reforestation by noble fir and western hemlock unless controlled. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes.

Among the common forest understory plants are vine maple, red huckleberry, western hazel, Oregongrape, trailing blackberry, and western brackenfern.

This map unit is in capability subclass VIe.

144—Underwood loam, 2 to 15 percent slopes. This very deep, well drained soil is on benches and foot slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt, andesite, and a thin mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 500 to 2,000 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 100 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 5 inches thick. The upper 14 inches of the subsoil is dark brown loam, and the lower 16 inches is dark brown clay loam. The substratum to a depth of 60 inches or more is dark yellowish brown loam.

Included in this unit are small areas of Chemawa and McElroy soils on terraces and foot slopes and Timberhead and Undusk soils on ridgetops. Also included are small areas of soils that are more than 35 percent clay. Included areas make up about 10 percent of the total acreage.

Permeability of this Underwood soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, hayland, pastureland, orchards, homesites, wildlife habitat, and recreation.

Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 153 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 116. The culmination of the mean annual increment (CMAI) for Douglas fir is 162 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for ponderosa pine and grand fir have not been made. Among the trees of limited extent are Oregon white oak and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine and grand fir occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir and ponderosa pine seedlings and can delay natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, common snowberry, Oregongrape, cascara buckthorn, western brackenfern, and princes pine.

If this unit is used for orchard crops, the main limitation is the hazard of erosion. If the ground is plowed in fall, runoff and erosion can be reduced by seeding to a cover crop.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing. In some years, supplemental irrigation is also needed.

The main limitations of this unit for use as homesites are steepness of slope, shrink-swell potential, moderately slow permeability, and the hazard of erosion in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

Use of sandy backfill for the trench and long absorption lines helps to compensate for the moderately slow permeability of the soil. During the rainy season, effluent from onsite sewage disposal systems may seep at points downslope. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite disposal systems. The effects of shrinking and swelling can be minimized by using proper engineering designs. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability subclass IIIe.

145—Underwood loam, 15 to 30 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt, andesite, and a thin mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 500 to 2,000 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 100 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 5 inches thick. The upper 14 inches of the subsoil is dark brown loam, and the lower 16 inches is dark brown clay loam. The substratum to a depth of 60 inches or more is dark yellowish brown loam.

Included in this unit are small areas of Chemawa and McElroy soils on back slopes and Timberhead and Undusk soils on ridgetops. Also included are small areas of soils that are more than 35 percent clay. Included areas make up about 10 percent of the total acreage.

Permeability of this Underwood soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, hayland, pastureland, wildlife habitat, recreation, and watershed.

Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 153 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 116. The culmination of the mean annual increment (CMAI) for Douglas fir is 162 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for ponderosa pine and grand fir have not been made. Among the trees of limited extent are Oregon white oak and bigleaf maple.

The main limitations for harvesting timber are seasonal soil wetness and snowpack. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine and grand fir occurs periodically. If the canopy is opened, brush invades and can delay establishment of Douglas fir seedlings and natural reforestation unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, common snowberry, Oregongrape, cascara buckthorn, western brackenfern, and princes pine.

This map unit is well suited to use as hayland and pastureland. The main limitations are steepness of slope and the hazard of erosion. Erosion can be controlled by growing pasture. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

This map unit is in capability subclass IVe.

146—Underwood loam, 30 to 50 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from basalt, andesite, and a thin mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 500 to 2,000 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 100 to 150 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown loam 5 inches thick. The upper 14 inches of the subsoil is dark brown loam, and the lower 16 inches is dark brown clay loam. The substratum to a depth of 60 inches or more is dark yellowish brown loam.

Included in this unit are small areas of Chemawa, McElroy, Timberhead, and Undusk soils. Also included are small areas of soils that are more than 35 percent clay and small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Underwood soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as woodland, wildlife habitat, recreation areas, and watershed.

Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 153 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 116. The culmination of the mean annual increment (CMAI) for Douglas fir is 162 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for ponderosa pine and grand fir have not been made. Among the trees of limited extent are Oregon white oak and bigleaf maple.

The main limitation for harvesting timber is steepness of slope. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by ponderosa pine and grand fir occurs periodically. If the canopy is opened, brush invades and can delay establishment of Douglas fir and ponderosa pine seedlings and natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, Pacific dogwood, common snowberry, Oregongrape, cascara buckthorn, western brackenfern, and princes pine.

This map unit is in capability subclass VIIe.

147—Undusk gravelly loam, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in residuum derived dominantly from basalt with a thin mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,000 to 2,800 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 120 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown gravelly loam 15 inches thick. The subsoil to a depth of 60 inches or more is dark brown very gravelly loam and extremely gravelly loam.

Included in this unit are small areas of Chemawa, McElroy, Timberhead, and Underwood soils on ridges and back slopes and St. Martin soils on landslides. Also included are small areas of soils that are less than 35 percent rock fragments and soils that are shallow to bedrock. Included areas make up about 12 percent of the total acreage.

Permeability of this Undusk soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir, grand fir, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 118 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 88. The culmination of the mean annual increment (CMAI) for Douglas fir is 111 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for grand fir and western hemlock have not been made. Among the trees of limited extent are red alder and western redcedar. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by grand fir and western hemlock occurs periodically. If the canopy is opened, brush invades and can delay the establishment of seedlings unless controlled. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are vine maple, western hazel, red huckleberry, western brackenfern, and common beargrass.

This map unit is in capability subclass IVe.

148—Undusk gravelly loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from basalt with a thin mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,000 to 2,800 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 120 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is dark brown gravelly loam 15 inches thick. The subsoil to a depth of 60 inches or more is dark brown very gravelly loam and extremely gravelly loam.

Included in this unit are small areas of Chemawa, McElroy, Timberhead, and Underwood soils on back slopes and St. Martin soils on landslides. Also included are small areas of soils that are shallow to bedrock, Rock outcrop, and Undusk soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Undusk soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, and recreation.

Douglas fir, grand fir, and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 118 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 88. The culmination of the mean annual increment (CMAI) for Douglas fir is 111 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for grand fir and western hemlock have not been made. Among the trees of limited extent are red alder and western redcedar.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by grand fir and western hemlock occurs periodically. If the canopy is opened, brush invades and can delay the establishment of seedlings. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are vine maple, western hazel, red huckleberry, western brackenfern, and common beargrass.

This map unit is in capability subclass VIIe.

149—Vanson sandy loam, 5 to 30 percent slopes. This deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in residuum and colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Where mixed to a depth of 9 inches, the surface layer typically is dark brown sandy loam. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part is dark yellowish brown very gravelly sandy loam 21 inches thick over fractured andesite. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Hatchet, Lonestar, and Swift soils. Also included are small areas of Rock outcrop and Vanson soils that are more than 60 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 102 for Douglas fir and 114 for western hemlock. On the basis of a 50-year site curve, the mean site index is 77 for Douglas fir and 78 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 86 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 168 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is noble fir. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Reforestation can be accomplished by planting noble fir and Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are vine maple, red huckleberry, common beargrass, western princes pine, Oregongrape, salal, and longtube twinflower.

This map unit is in capability subclass VIs.

150—Vanson sandy loam, 30 to 65 percent slopes. This deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Where mixed to a depth of 9 inches, the surface layer typically is dark brown sandy loam. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part is dark yellowish brown very gravelly sandy loam 21 inches thick over fractured andesite. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Hatchet, Lonestar, and Swift soils. Also included are small areas of Rock outcrop and Vanson soils that are more than 60 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 102 for Douglas fir and 114 for western hemlock. On the basis of a 50-year site curve, the mean site index is 77 for Douglas fir and 78 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 86 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 168 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is noble fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished by planting noble fir and Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth.

Among the common forest understory plants are vine maple, red huckleberry, common beargrass, western princes pine, Oregongrape, salal, and longtube twinflower.

This map unit is in capability subclass VIIe.

151—Vanson sandy loam, 65 to 90 percent slopes. This deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

Where mixed to a depth of 9 inches, the surface layer typically is dark brown sandy loam. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part is dark yellowish brown very gravelly sandy loam 21 inches thick over fractured andesite. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Hatchet, Lonestar, and Swift soils. Also included are small areas of Rock outcrop and Vanson soils that are more than 60 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 102 for Douglas fir and 114 for western hemlock. On the basis of a 50-year site curve, the mean site index is 77 for Douglas fir and 78 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 86 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 168 cubic feet at age 50. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is noble fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack limits the use of equipment and restricts access. Logging roads generally need full bench construction and require frequent maintenance. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Reforestation can be accomplished by planting noble fir and Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment.

Among the common forest understory plants are vine maple, red huckleberry, common beargrass, western princes pine, Oregongrape, salal, and longtube twinflower.

This map unit is in capability subclass VIIe.

152—Vanson sandy loam, cold, 5 to 30 percent slopes. This deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

Where mixed to a depth of 9 inches, the surface layer typically is dark brown sandy loam. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part is dark yellowish brown very gravelly sandy loam 21 inches thick over fractured andesite. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Hatchet, Lonestar, and Tradedollar soils. Also included are small areas of Rock outcrop and Vanson soils that are more than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 70 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are Douglas fir and subalpine fir. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitation for harvesting timber is snowpack in winter. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. The mortality rate of seedlings is higher in areas on ridgetops that are subject to strong, persistent winds than in other areas of this unit. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment.

Among the common forest understory plants are vine maple, red huckleberry, common beargrass, western princes pine, Oregongrape, salal, and longtube twinflower.

This map unit is in capability subclass VIs.

153—Vanson sandy loam, cold, 30 to 65 percent slopes. This deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

Where mixed to a depth of 9 inches, the surface layer typically is dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part is dark yellowish brown very gravelly sandy loam 21 inches thick over fractured andesite. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Hatchet, Lonestar, and Tradedollar soils. Also included are small areas of Rock outcrop and Vanson soils that are more than 60 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 70. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are Douglas fir and subalpine fir.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment.

Among the common forest understory plants are vine maple, red huckleberry, common beargrass, western princes pine, Oregongrape, salal, and longtube twinflower.

This map unit is in capability subclass VIIe.

154—Vanson-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 70 percent Vanson sandy loam, 30 to 65 percent slopes, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Hatchet, Lonestar, and Swift soils. Also included are small areas of Vanson soils that are more than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

The Vanson soil is deep and well drained. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. Where mixed to a depth of 9 inches, the surface layer typically is dark brown sandy loam. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part is dark yellowish brown very gravelly sandy loam 21 inches thick over fractured andesite. Depth to bedrock ranges from 40 to 60 inches.

Permeability of this Vanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

Rock outcrop consists mainly of exposed areas of andesite. Numerous escarpments are in this unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on the Vanson soil. On the basis of a 100-year site curve, the mean site index is 102 for Douglas fir and 114 for western hemlock. On the basis of a 50-year site curve, the mean site index is 77 for Douglas fir and 78 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 86 cubic feet per acre per year at age 60 and the CMAI for western hemlock is 168 cubic feet at age 50. The areas of Rock outcrop make up about 20 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is noble fir.

The main limitations for harvesting timber are Rock outcrop, steepness of slope, and snowpack in winter. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished by planting noble fir and Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. The areas of Rock outcrop limit the even distribution of reforestation.

Among the common forest understory plants are vine maple, red huckleberry, common beargrass, western princes pine, Oregongrape, salal, and longtube twinflower.

The Vanson soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

155—Vanson-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees

F, and the average frost-free period is 75 to 95 days.

This unit is about 70 percent Vanson gravelly sandy loam, 65 to 90 percent slopes, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Hatchet, Lonestar, and Swift soils. Also included are small areas of Vanson soils that are more than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

The Vanson soil is deep and well drained. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. Where mixed to a depth of 6 inches, the surface layer typically is very dark grayish brown gravelly sandy loam. The upper 7 inches of the subsoil is dark yellowish brown sandy loam and dark brown very gravelly loamy sand, and the lower part is dark yellowish brown very gravelly sandy loam 21 inches thick over fractured andesite. Depth to bedrock ranges from 40 to 60 inches.

Permeability of this Vanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists mainly of exposed areas of andesite. Numerous escarpments are in this unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Douglas fir, and Pacific silver fir are the main woodland species on the Vanson soil. On the basis of a 100-year site curve, the mean site index is 102 for Douglas fir and 114 for western hemlock. On the basis of a 50-year site curve, the mean site index is 77 for Douglas fir and 78 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 86 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 168 cubic feet at age 50. The areas of Rock outcrop make up about 20 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir have not been made. Among the trees of limited extent is noble fir.

The main limitations for harvesting timber are Rock outcrop, steepness of slope, and snowpack in winter. Cable yarding systems generally are used on this unit. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Reforestation can be accomplished by planting noble fir and Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. The areas of Rock outcrop limit the even distribution of reforestation.

Among the common forest understory plants are vine maple, red huckleberry, common beargrass, western princes pine, Oregongrape, salal, and longtube twinflower.

The Vanson soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

156—Vanson, cold-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 70 percent Vanson sandy loam, cold, 65 to 90 percent slopes, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Hatchet, Lonestar, and Tradedollar soils. Also included are small areas of Vanson soils that are more than 60 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

The Vanson soil is deep and well drained. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. Where mixed to a depth of 9 inches, the surface layer typically is dark brown sandy loam. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part is dark yellowish brown very gravelly sandy loam 21 inches thick over fractured andesite. Depth to bedrock ranges from 40 to 60 inches.

Permeability of this Vanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists mainly of exposed areas of andesite. Numerous escarpments are in this unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Western hemlock, Pacific silver fir, and noble fir are the main woodland species on the Vanson soil. On the basis of a 100-year site curve, the mean site index is estimated to be 98 for western hemlock, and on the basis of a 50-year site curve, the mean site index is estimated to be 70 for western hemlock. The culmination of the mean annual increment (CMAI) for western hemlock is 118 cubic feet per acre per year at age 60. The areas of Rock outcrop make up about 20 percent of this unit and reduce yield accordingly. Estimates of the site index or CMAI for Pacific silver fir and noble fir have not been made. Among the trees of limited extent are Douglas fir and subalpine fir. Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.

The main limitations for harvesting timber are snowpack in winter and steepness of slope. Cable yarding systems generally are used on this unit. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Snowpack in winter limits the use of equipment and restricts access. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling mortality is the main concern in the production of timber. Reforestation can be accomplished by planting noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock and Pacific silver fir occurs periodically. The areas of Rock outcrop limit the even distribution of reforestation. Logging activities can readily displace the surface layer. Seedlings that develop in the less fertile subsoil exhibit poor growth. Low soil temperature in summer, deep snowpack, and a short growing season reduce the survival rate of planted and natural seedlings and delay their establishment.

Among the common forest understory plants are maple, red huckleberry, common beargrass, western princes pine, Oregongrape, salal, and longtube twinflower.

The Vanson soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

157—Washougal loam, 0 to 3 percent slopes. Th very deep, well drained soil is on terraces. It formed gravelly alluvium derived dominantly from volcanic as basalt, and andesite. The native vegetation is mainly mixed conifers and hardwoods. Elevation is 50 to 80 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about degrees F, and the average frost-free period is 120 180 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thic The upper part of the surface layer is black loam 5 inches thick, and the lower part is very dark brown gravelly loam 17 inches thick. The upper part of the underlying material is dark brown very gravelly loam inches thick, the next 6 inches is dark brown very gravelly coarse sandy loam, and the lower part to a depth of 60 inches or more is dark brown extremely cobbly coarse sand.

Included in this unit are small areas of Bonneville soils on river terraces, Mountzion and Skoly soils on mountain slopes, and Hesson soils on terraces. Also included are small areas of moderately well drained soils and soils that are less than 35 percent rock fragments. Included areas make up about 20 percen the total acreage.

Permeability of this Washougal soil is moderate the upper part of the underlying material and very ra in the lower part. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff slow, and the hazard of water erosion is slight. This is subject to rare periods of flooding.

This unit is used mainly as woodland and homes It is also used for hayland, pastureland, and recrea

Douglas fir, red alder, and western hemlock are main woodland species on this unit. On the basis of 100-year site curve, the mean site index is 143 for Douglas fir, and on the basis of a 50-year site curve the mean site index is 114. The culmination of the mean annual increment (CMAI) for Douglas fir is 14 cubic feet per acre per year at age 65. Estimates of site index or CMAI for red alder and western hemlo have not been made. Among the trees of limited extent are western redcedar and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. If the canopy is opened, brush invades and can prevent the establishment of seedlings unless controlled.

Among the common forest understory plants are vine maple, salal, red huckleberry, Oregongrape, western hazel, trailing blackberry, and western swordfern.

The main limitation of this unit for use as homesites is the hazard of flooding. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Cutbanks are unstable and are subject to slumping. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. The soil in this unit is subject to frost action, which may limit construction of roads and streets. The main limitation for septic tank absorption fields is the risk of contaminating ground water because of poor filtration. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing. In some years, supplemental irrigation is needed.

This map unit is in capability subclass IIIs.

158—Washougal gravelly loam, 2 to 8 percent slopes. This very deep, well drained soil is on terraces. It formed in mixed alluvium derived dominantly from basalt, andesite, and some volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 800 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 120 to 180 days.

Typically, the upper part of the surface layer is black gravelly loam 11 inches thick and the lower part is very dark brown very gravelly loam 25 inches thick. The subsoil is dark yellowish brown very gravelly loam 8 inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Included in this unit are small areas of Skamania and Stabler soils and St. Martin soils on landslides. Also included are small areas of Washougal soils that have slopes of more than 8 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Washougal soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for hayland, pastureland, homesites, wildlife habitat, or recreation. It is also used as woodland.

This unit is well suited to use as hayland and pastureland. It has few limitations. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing. In some years supplemental irrigation is also needed.

This unit is well suited to use as homesites. It has few limitations. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Cutbanks are unstable and are subject to slumping. The soil in this unit is subject to frost action, which may limit construction of roads and streets.

Douglas fir, red alder, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 158 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 119. The culmination of the mean annual increment (CMAI) for Douglas fir is 168 cubic feet per acre per year at age 65. Estimates of the site index or CMAI for red alder and grand fir have not been made. Among the trees of limited extent are western hemlock and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment and mortality are the main concerns in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily and by grand fir, periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can delay the establishment of Douglas fir seedlings and natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, salal, Oregongrape, red huckleberry, and thimbleberry.

This map unit is in capability subclass IIIs.

159—Washougal gravelly loam, 8 to 30 percent slopes. This very deep, well drained soil is on terraces and terrace escarpments. It formed in mixed alluvium derived dominantly from basalt, andesite, and some volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 200 to 800 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 120 to 180 days.

Typically, the upper part of the surface layer is black gravelly loam 11 inches thick and the lower part is very dark brown very gravelly loam 25 inches thick. The subsoil is dark yellowish brown very gravelly loam 8 inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Included in this unit are small areas of Skamania and Stabler soils and St. Martin soils on landslides. Also included are small areas of Washougal soils that have slopes of less than 8 percent or more than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Washougal soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for hayland, pastureland, homesites, woodland, wildlife habitat, and recreation.

This unit is suited to use as hayland and pastureland. The main limitations are steepness of slope and the hazard of erosion. Erosion can be controlled by growing pasture. The use of equipment is limited by steepness of slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Mowing helps to maintain uniform growth and discourages selective grazing.

The main limitations of this unit for use as homesites are steepness of slope and the hazard of erosion in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of the slopes. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Cutbanks are unstable and are subject to slumping. This soil is subject to frost action, which may limit construction of roads and streets. Steepness of slope limits installation of septic tank absorption fields. Absorption lines should be installed on the contour.

Douglas fir, red alder, and grand fir are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 158 for Douglas fir, and on the basis of a 50-year site curve, the mean site index is 119 for Douglas fir. The culmination of the mean annual increment (CMAI) for Douglas fir is 168 cubic feet per acre per year at age 65. Estimates of the site index or CMAI for red alder and grand fir have not been made. Among the trees of limited extent are western hemlock and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed es are present, natural reforestation of cutover areas red alder occurs readily and by grand fir, riodically. Droughtiness of the surface layer reduces edling survival, especially on south- and southwest- cing slopes. If the canopy is opened, brush invades d can delay the establishment of Douglas fir edlings and natural reforestation by grand fir unless ntrolled.

Among the common forest understory plants are vine aple, salal, Oregongrape, red huckleberry, and mbleberry.

This map unit is in capability subclass IVe.

160—Washougal gravelly loam, 30 to 50 percent opes. This very deep, well drained soil is on terrace carpments. It formed in mixed alluvium derived minantly from basalt, andesite, and some volcanic h. The native vegetation is mainly mixed conifers and rubs. Elevation is 200 to 800 feet. The average nual precipitation is about 60 inches, the average nual air temperature is about 48 degrees F, and the erage frost-free period is 120 to 180 days.

Typically, the upper part of the surface layer is black avelly loam 11 inches thick and the lower part is very rk brown very gravelly loam 25 inches thick. The bsoil is dark yellowish brown very gravelly loam 8 hes thick. The substratum to a depth of 60 inches or re is dark yellowish brown very gravelly sandy loam.

Included in this unit are small areas of Skamania and abler soils and St. Martin soils on landslides. Also luded are small areas of Washougal soils that have pes of less than 30 percent. Included areas make up out 15 percent of the total acreage.

Permeability of this Washougal soil is moderate. ailable water capacity is moderate. Effective rooting pth is 60 inches or more. Runoff is medium, and the zard of water erosion is moderate.

This unit is used for woodland, recreation, and dlife habitat.

Douglas fir, red alder, and grand fir are the main odland species on this unit. On the basis of a 100- ar site curve, the mean site index is 158 for Douglas and on the basis of a 50-year site curve, the mean index is 119. The culmination of the mean annual rement (CMAI) for Douglas fir is 168 cubic feet per e per year at age 65. Estimates of the site index or AI for red alder and grand fir have not been made. ong the trees of limited extent are western hemlock bigleaf maple.

The main limitation for harvesting timber is steepness slope, which restricts the use of wheeled and tracked ipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment and mortality are the main concerns in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily and by grand fir, periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can delay establishment of Douglas fir seedlings and natural reforestation by grand fir unless controlled.

Among the common forest understory plants are vine maple, Oregongrape, salal, red huckleberry, thimbleberry, Pacific dogwood, dwarf rose, princes pine, and common snowberry.

This map unit is in capability subclass VIIe.

161—Xerorthents-Rock outcrop complex, 50 to 90 percent slopes. This map unit is on escarpments. It formed in colluvium derived dominantly from basalt, andesite, and some volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 100 to 2,200 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 53 degrees F, and the average frost-free period is 130 to 150 days.

This unit is about 65 percent Xerorthents and 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of McElroy and Skoly soils on mountain slopes. Also included are small areas of soils that have a cemented substratum or have slopes of less than 50 percent or more than 90 percent. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Xerorthents are shallow to deep and are well drained. They formed in colluvium derived dominantly from basalt, andesite, and some volcanic ash. No single profile of Xerorthents is typical, but one commonly observed in the survey area has a surface layer of very dark grayish brown gravelly loam 6 inches thick. The upper 17 inches of the underlying material is dark brown very gravelly loam, and the lower part to a depth of 31 inches is brown extremely gravelly clay loam. Bedrock is at a depth of 31 inches. Depth to bedrock ranges from 10 to 60 inches or more.

Permeability of these Xerorthents is moderate. Available water capacity is low. Effective rooting depth is 10 to 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists mainly of exposed areas of basalt and andesite. Numerous escarpments are in this unit.

This unit is used for recreation, wildlife habitat, and esthetic value.

This unit is poorly suited to the production of timber. Ponderosa pine and Oregon white oak are the main woodland species on the Xerorthents.

Among the common forest understory plants are snowberry, Oregongrape, rose, trailing blackberry, and western hazel.

The Xerorthents are in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

162—Yalelake sandy loam, 2 to 30 percent slopes. This very deep, well drained soil is on terraces. It formed in volcanic ash and pumice over pyroclastic deposits. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,800 feet. The average annual precipitation is about 120 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 135 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark brown and dark brown sandy loam 11 inches thick. The upper 9 inches of the subsoil is dark grayish brown gravelly loamy sand, and the lower 19 inches is dark yellowish brown gravelly sandy loam. The substratum to a depth of 60 inches or more is brownish yellow sand and dark yellowish brown gravelly loam.

Included in this unit are small areas of Cinnamon and Swift soils on mountain slopes and Forsyth and Pinchot soils on terraces. Also included are small areas of Yalelake soils that are more than 35 percent rock fragments. Included areas make up about 8 percent of the total acreage.

Permeability of this Yalelake soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as woodland, recreation areas, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 164 for Douglas fir and 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is 120 for Douglas fir and 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 174 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 244 cubic feet at age 50. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, salal, western brackenfern, western swordfern, Oregongrape, and Pacific dogwood.

This map unit is in capability subclass IVe.

163—Yalelake sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on terrace escarpments. It formed in volcanic ash and pumice over pyroclastic deposits. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,800 feet. The average annual precipitation is about 120 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 135 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark brown and dark brown sandy loam 11 inches thick. The upper 9 inches of the subsoil is dark grayish brown gravelly loamy sand, and the lower 19 inches is dark yellowish brown gravelly andy loam. The substratum to a depth of 60 inches or ore is brownish yellow sand and dark yellowish brown avelly loam.

ncluded in this unit are small areas of Cinnamon and wift soils on mountain slopes and Pinchot soils on rraces. Also included are small areas of Yalelake soils at are more than 35 percent rock fragments. Included eas make up about 10 percent of the total acreage.

Permeability of this Yalelake soil is moderate. ailable water capacity is high. Effective rooting depth 60 inches or more. Runoff is medium, and the hazard water erosion is moderate.

This unit is used for woodland, recreation, wildlife abitat, and watershed.

Douglas fir and western hemlock are the main oodland species on this unit. On the basis of a 100- ar site curve, the mean site index is 164 for Douglas and 154 for western hemlock. On the basis of a 50- ar site curve, the mean site index is 120 for Douglas and 110 for western hemlock. The culmination of the ean annual increment (CMAI) for Douglas fir is 174 bic feet per acre per year at age 60, and the CMAI western hemlock is 244 cubic feet at age 50. Among e trees of limited extent are western redcedar and red der.

The main limitation for harvesting timber is the eepness of slope, which restricts the use of wheeled d tracked equipment in skidding. Cable yarding stems generally are safer and disturb the soil less. e of wheeled and tracked equipment when the soil is ist produces ruts, compacts the soil, and damages roots of trees. Unsurfaced roads and skid trails are t and can be impassable when wet. Logging roads uire suitable surfacing for year-round use. Rock for d construction is not readily available in this unit. ablishing plant cover on steeper slopes that have en cut or filled reduces erosion. Steep yarding paths, d trails, and firebreaks are subject to rilling and lying unless plant cover is maintained or adequate ter bars are provided.

Seedling establishment is the main concern in the duction of timber. Reforestation can be omplished by planting Douglas fir seedlings. If seed es are present, natural reforestation of cutover areas western hemlock occurs periodically. If the canopy is ned, brush invades and can prevent the ablishment of Douglas fir seedlings and can delay ural reforestation by western hemlock unless trolled.

mong the common forest understory plants are vine le, salal, western brackenfern, western swordfern, gongrape, and Pacific dogwood.

This map unit is in capability subclass VIIe.

164—Yalelake sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on terrace escarpments. It formed in volcanic ash and pumice over pyroclastic deposits. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,800 feet. The average annual precipitation is about 120 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 135 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 1 inch thick. The surface layer is very dark brown and dark brown sandy loam 11 inches thick. The upper 9 inches of the subsoil is dark grayish brown gravelly loamy sand, and the lower 19 inches is dark yellowish brown gravelly sandy loam. The substratum to a depth of 60 inches or more is brownish yellow sand and dark yellowish brown gravelly loam.

Included in this unit are small areas of Cinnamon and Swift soils on mountain slopes and Pinchot soils on terraces. Also included are small areas of Yalelake soils that are more than 35 percent rock fragments and Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Yalelake soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 164 for Douglas fir and 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is 120 for Douglas fir and 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 174 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 244 cubic feet at age 50. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is the steepness of slope. Cable yarding systems generally are used on this unit. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Following road construction and clearcutting, road failures and landslides can occur. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, salal, western brackenfern, western swordfern, Oregongrape, and Pacific dogwood.

This map unit is in capability subclass VIIe.

165—Zygore gravelly loam, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes of mountains. It formed in colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,000 to 3,000 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark brown and very dark grayish brown gravelly loam 14 inches thick. The upper 12 inches of the subsoil is dark brown very gravelly loam, and the lower 11 inches is dark yellowish brown very gravelly silt loam. The substratum to a depth of 60 inches or more is dark yellowish brown extremely gravelly silt loam.

Included in this unit are small areas of Aschoff and Skoly soils and St. Martin soils on landslides. Also included are small areas of Rock outcrop, cool soils, and soils that have less than 35 percent rock fragments. Included areas make up about 12 percent of the total acreage.

Permeability of this Zygore soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 120 for Douglas fir and western hemlock. On the basis of a 50-year site curve, the mean site index is 92 for Douglas fir and 85 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 115 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 180 cubic feet at age 50. Among the trees of limited extent are red alder and western redcedar.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbance of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs readily.

Among the common forest understory plants are vine maple, oceanspray, salal, red huckleberry, western redcedar, western brackenfern, Oregon oxalis, and common beargrass.

This map unit is in capability subclass IVe.

166—Zygore gravelly loam, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,000 to 3,000 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark brown and very dark grayish brown gravelly loam 14 inches thick. The upper 12 inches of the subsoil is dark brown very gravelly loam, and the lower 11 inches is dark yellowish brown very gravelly silt loam. The substratum to a depth of 60 inches or more is dark yellowish brown extremely gravelly silt loam.

Included in this unit are small areas of Aschoff and

Skoly soils and Andic Cryumbrepts on ridgetops. Also included are small areas of Rock outcrop and shallow soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Zygore soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 120 for Douglas fir and western hemlock. On the basis of a 50-year site curve, the mean site index is 92 for Douglas fir and 85 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 115 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 180 cubic feet at age 50. Among the trees of limited extent are red alder and western redcedar.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs readily.

Among the common forest understory plants are vine maple, creambush oceanspray, salal, red huckleberry, western redcedar, western brackenfern, Oregon oxalis, and common beargrass.

This map unit is in capability subclass VIIe.

167—Zygore-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on back slopes of mountains. The native vegetation is mainly mixed conifers and shrubs. Elevation is 2,000 to 3,000 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 90 to 110 days.

This unit is about 60 percent Zygore gravelly loam, 30 to 65 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Aschoff, Dougan, and Skoly soils. Also included are small areas of shallow soils and Rubble land, mainly adjacent to the Rock outcrop. Included areas make up about 10 percent of the total acreage.

The Zygore soil is very deep and well drained. It formed in colluvium derived dominantly from basalt and andesite mixed with volcanic ash. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark brown gravelly loam 14 inches thick. The upper 12 inches of the subsoil is dark brown very gravelly loam, and the lower 11 inches is dark yellowish brown very gravelly silt loam. The substratum to a depth of 60 inches or more is dark yellowish brown extremely gravelly silt loam.

Permeability of the Zygore soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists of exposed areas of dominantly basalt, andesite, and some granodiorite. Numerous escarpments are in this unit.

Most areas of this unit are used for woodland, wildlife habitat, recreation, and watershed. A few areas are used as a source of gravel.

Douglas fir and western hemlock are the main woodland species on the Zygore soil. On the basis of a 100-year site curve, the mean site index is 120 for Douglas fir and is estimated to be 120 for western hemlock. On the basis of a 50-year site curve, the mean site index is 92 for Douglas fir and is estimated to be 85 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 115 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 180 cubic feet at age 50. The areas of Rock outcrop make up about 30 percent of this unit and reduce yield accordingly. Among the trees of limited extent are red alder and western redcedar.

The main limitations for harvesting timber are Rock outcrop and steepness of slope. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Rock outcrop may cause breakage of timber and hinder yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Reforestation can be accomplished on the Zygor soil by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs readily. The areas of Rock outcrop limit the even distribution of reforestation.

Among the common forest understory plants are vine maple, creambush oceanspray, salal, red huckleberry, western redcedar, western brackenfern, Oregon oxalis, and common beargrass.

The Zygore soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

168—Zymer sandy loam, 2 to 30 percent slopes. This very deep, well drained soil is on mountain slopes. It formed in colluvium derived dominantly from volcanic ash and from basic igneous rock with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,600 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper 4 inches of the surface layer is dark brown sandy loam, and the lower 6 inches is dark brown loamy sand. The upper 12 inches of the subsoil is dark yellowish brown cindery loamy sand, and the lower 6 inches is dark yellowish brown very gravelly loam. The substratum to a depth of 60 inches or more is yellowish brown and dark yellowish brown extremely gravelly loam.

Included in this unit are small areas of Cinnamon and Swift soils and Yalelake soils on terraces. Also included are small areas of shallow soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Zymer soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 167 for Douglas fir and 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 125 for Douglas fir and 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 178 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 244 cubic feet at age 50. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Disturbances of the protective layer of duff can be reduced with the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can prevent the establishment of seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, trailing blackberry, thimbleberry, Oregon oxalis, western swordfern, and pearly everlasting.

This map unit is in capability subclass IVe.

169—Zymer sandy loam, 30 to 65 percent slopes. This very deep, well drained soil is on mountain slopes. It formed in colluvium derived dominantly from volcanic ash and from basic igneous rock with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,600 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper 4 inches of the surface layer is dark brown sandy loam, and the lower 6 inches is dark brown loamy sand. The upper 12 inches of the subsoil is dark yellowish brown cindery loamy sand, and the lower 6 inches is dark yellowish brown very gravelly loam. The substratum to a depth of 60 inches or more is yellowish brown and dark yellowish brown extremely gravelly loam.

Included in this unit are small areas of Cinnamon and Swift soils and Yalelake soils on terrace escarpments. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Zymer soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 167 for Douglas fir and 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 125 for Douglas fir and 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 178 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 244 cubic feet at age 50. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, trailing blackberry, thimbleberry, Oregon oxalis, western swordfern, and pearly everlasting.

This map unit is in capability subclass VIIe.

170—Zymer sandy loam, 65 to 90 percent slopes. This very deep, well drained soil is on mountain slopes. It formed in colluvium derived dominantly from volcanic ash and from basic igneous rock with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 800 to 1,600 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper 4 inches of the surface layer is dark brown sandy loam, and the lower 6 inches is dark brown loamy sand. The upper 12 inches of the subsoil is dark yellowish brown cindery loamy sand, and the lower 6 inches is dark yellowish brown very gravelly loam. The substratum to a depth of 60 inches or more is yellowish brown and dark yellowish brown extremely gravelly loam.

Included in this unit are small areas of Cinnamon and Swift soils and Yalelake soils on terrace escarpments. Also included are small areas of Rock outcrop and Zymer soils that are less than 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Zymer soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is estimated to be 167 for Douglas fir and 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 125 for Douglas fir and 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 178 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 244 cubic feet at age 50. Among the trees of limited extent are western redcedar and red alder.

The main limitation for harvesting timber is steepness of slope. Cable yarding systems generally are used on this unit. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Following road construction and clearcutting, road failures and landslides can occur. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, trailing blackberry, thimbleberry, Oregon oxalis, western swordfern, and pearly everlasting.

This map unit is in capability subclass VIIe.

171—Zymer-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on mountain slopes. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,200 to 1,600 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 110 to 130 days.

This unit is about 65 percent Zymer sandy loam, 30 to 65 percent slopes, and about 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Swift soils and Yalelake soils on terraces. Also included are small areas of shallow soils. Included areas make up about 10 percent of the total acreage.

The Zymer soil is very deep and well drained. It formed in colluvium derived dominantly from volcanic ash and from basic igneous rock with a mantle of volcanic ash. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper 4 inches of the surface layer is dark brown sandy loam, and the lower 6 inches is dark brown loamy sand. The upper 12 inches of the subsoil is dark yellowish brown cindery loamy sand, and the lower 6 inches is dark yellowish brown very gravelly loam. The substratum to a depth of 60 inches or more is yellowish brown and dark yellowish brown extremely gravelly loam.

Permeability of this Zymer soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Rock outcrop consists of exposed areas of dominantly andesite and basalt. Numerous escarpments are in the unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on the Zymer soil. On the basis of a 100-year site curve, the mean site index is estimated to be 167 for Douglas fir and 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 125 for Douglas fir and 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 178 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 244 cubic feet at age 50. The areas of Rock outcrop make up about 25 percent of this unit and reduce yield accordingly. Among the trees of limited extent are western redcedar and red alder.

The main limitations for harvesting timber are steepness of slope and the areas of Rock outcrop. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding. Cable yarding systems generally are safer and disturb the soil less. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Avoiding areas of Rock outcrop forces yarding and skidding paths to converge, which increases compaction and erosion of the soil. Occasional snowpack hinders the use of equipment and limits access in winter. Use of wheeled and tracked equipment when the soil is wet produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. The areas of Rock outcrop limit the even distribution of reforestation. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can prevent the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, trailing blackberry, thimbleberry, Oregon oxalis, western swordfern, and pearly everlasting.

The Zymer soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

172—Zymer-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on mountain slopes. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,200 to 1,600 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 110 to 130 days.

This unit is about 60 percent Zymer sandy loam, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Swift soils and Yalelake soils on terrace escarpments. Also included are small areas of shallow soils. Included areas make up about 10 percent of the total acreage.

The Zymer soil is very deep and well drained. It formed in colluvium derived dominantly from volcanic ash and from basic igneous rock with a mantle of volcanic ash. Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The upper 4 inches of the surface layer is dark brown sandy loam, and the lower 6 inches is dark brown loamy sand. The upper 12 inches of the subsoil is dark yellowish brown cindery loamy sand, and the lower 6 inches is dark yellowish brown very gravelly loam. The substratum to a depth of 60 inches or more is yellowish brown and dark yellowish brown extremely gravelly loam.

Permeability of this Zymer soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Rock outcrop consists mainly of exposed areas of andesite and basalt. Numerous escarpments are in the unit.

This unit is used for woodland, recreation, wildlife habitat, and watershed.

Douglas fir and western hemlock are the main woodland species on the Zymer soil. On the basis of a 100-year site curve, the mean site index is estimated to be 167 for Douglas fir and 154 for western hemlock. On the basis of a 50-year site curve, the mean site index is estimated to be 125 for Douglas fir and 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 178 cubic feet per acre per year at age 60, and the CMAI for western hemlock is 244 cubic feet at age 50. The areas of Rock outcrop make up about 30 percent of this unit and reduce yield accordingly. Among the trees of limited extent are western redcedar and red alder.

The main limitations for harvesting timber are steepness of slope and the areas of Rock outcrop. Cable yarding systems generally are used on this unit. Rock outcrop may cause breakage of timber when felled and can hinder yarding operations. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this unit. Logging roads generally need full bench construction and require frequent maintenance. Following road construction and clearcutting, road failures and landslides can occur. Occasional snowpack hinders the use of equipment and limits access in winter. Establishing plant cover on steeper slopes that have been cut or filled reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Harvesting systems that lift logs entirely off the ground reduce the disturbance of the protective layer of duff.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. The areas of Rock outcrop limit the even distribution of reforestation. Droughtiness of the surface layer reduces seedling survival, especially on south- and southwest-facing slopes. If the canopy is opened, brush invades and can delay the establishment of Douglas fir seedlings and can delay natural reforestation by western hemlock unless controlled.

Among the common forest understory plants are vine maple, red huckleberry, trailing blackberry, thimbleberry, Oregon oxalis, western swordfern, and pearly everlasting.

The Zymer soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

173—Zynbar gravelly silt loam, till substratum, 8 to 30 percent slopes. This very deep, well drained soil is on foot slopes and terraces. It formed in volcanic ash and colluvium derived dominantly from basic igneous rock over glacial drift. The native vegetation is mainly mixed conifers and shrubs. Elevation is 1,800 to 2,400 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 100 to 160 days.

Typically, the surface is covered with a mat of decomposed needles, leaves, and twigs 2 inches thick. The surface layer is very dark grayish brown gravelly silt loam 6 inches thick. The upper 11 inches of the subsoil is dark brown silt loam, and the lower 30 inches is yellowish brown silt loam. The upper 10 inches of the substratum is dark yellowish brown extremely stony silt loam, and the lower part to a depth of 60 inches or more is gray very gravelly loam.

Included in this unit are small areas of Hoffstadt, Tradedollar, and Vanson soils. Also included are small areas of Rock outcrop and Zynbar soils that have a till substratum at a depth of more than 60 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Zynbar soil is moderate. Available water capacity is high. Effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 3 to 4 feet from December to March.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Douglas fir and western hemlock are the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 161 for Douglas fir and 157 for western hemlock. On the basis of a 50-year site curve, the mean site index is 123 for Douglas fir and 110 for western hemlock. The culmination of the mean annual increment (CMAI) for Douglas fir is 171 cubic feet per acre per year at age 65, and the CMAI for western hemlock is 249 cubic feet at age 50. Among the trees of limited extent are red alder, western redcedar, and bigleaf maple.

The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available in this unit. Occasional snowpack hinders the use of equipment and limits access in winter.

Seedling establishment is the main concern in the production of timber. Reforestation can be accomplished by planting Douglas fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. If the canopy is opened, brush invades and can delay the establishment of seedlings and natural reforestation unless controlled.

Among the common forest understory plants are red huckleberry, Oregongrape, western swordfern, trailing blackberry, longtube twinflower, and Oregon oxalis.

This map unit is in capability subclass IVe.

200—Bandid extremely cindery loamy sand, overblown, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes and toe slopes of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. Elevation is 2,000 to 2,800 feet. Native vegetation before the cinderfall was mainly mixed conifers and shrubs. The average annual precipitation is about 130 inches, the average air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand and the next 10 inches is dark gray very cindery sand and gravelly sand. Below this is a buried surface layer that is very dark grayish brown cindery sandy loam in the upper 3 inches and brown fine sandy loam and black loamy sand in the lower 6 inches. The upper part of the subsoil is dark gray cindery fine sandy loam 10 inches thick, the next 11 inches is light gray extremely cindery sand, and the lower part to a depth of 60 inches or more is stratified, dark gray cindery sandy loam to black loamy sand.

Included in this unit are areas in which the cinderfall is more than 20 inches deep. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Bandid soil is moderately rapid in the upper part of the subsoil, very rapid in the next 11 inches, and moderately rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for woodland, recreation, wildlife habitat, and watershed.

This map unit is in capability subclass IVe.

201—Bandid extremely cindery loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes and toe slopes of mountains. These soils formed in stratified, aerially deposited volcanic ash and pumice. Elevation is 1,800 to 2,800 feet. Native vegetation before the cinderfall was mainly mixed conifers and shrubs. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

This soil is overblown by cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand and the next 10 inches is dark gray very cindery sand and gravelly sand. Below this is a buried surface layer that is very dark grayish brown cindery sandy loam in the upper 3 inches and is brown fine sandy loam and black loamy sand in the lower 6 inches. The upper part of the subsoil is dark gray cindery fine sandy loam 10 inches thick, the next 11 inches is light gray extremely cindery sand, and the lower part to a depth of 60 inches or more is stratified, dark gray cindery sandy loam to black loamy sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Bandid soil is moderately rapid in the upper part of the subsoil, very rapid in the next 11 inches, and moderately rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for woodland, recreation, wildlife habitat, and watershed.

This map unit is in capability subclass VIIe.

202—Bandid extremely cindery loamy sand, overblown, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. These soils formed in stratified, aerially deposited volcanic ash and pumice. Elevation is 1,800 to 2,800 feet. Native vegetation before the cinderfall was mainly mixed conifers and shrubs. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray cindery loamy sand and the next 10 inches is dark gray very cindery sand and gravelly sand. Below this is a buried surface layer that is very dark grayish brown cindery sandy loam in the upper 3 inches and brown fine sandy loam and black loamy sand in the lower 6 inches. The upper part of the subsoil is dark gray gravelly fine sandy loam 10 inches thick, the next 11 inches is light gray extremely cindery sand, and the lower part to a depth of 60 inches or more is stratified, dark gray cindery sandy loam to black loamy sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas where the original surface layer is exposed as a result of erosion. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Bandid soil is moderately rapid in the upper part of the subsoil, very rapid in the next 11 inches, and moderately rapid in the lower part. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for woodland, recreation, wildlife habitat, and watershed.

This map unit is in capability subclass VIIe.

203—Cattcreek loamy sand, overblown, cold, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes and in cirque basins on mountains. These soils formed in pumice and volcanic ash over colluvium derived from andesite. Elevation is 4,000 to 5,300 feet. Native vegetation before the ashfall was mainly true firs and shrubs. The average annual precipitation is about 110 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 70 to 90 days.

This soil is overblown by ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is dark grayish brown and dark yellowish brown very cindery loamy sand 6 inches thick. The upper 9 inches of the subsoil is dark brown very cindery sand, and the lower 15 inches is strong brown extremely cindery sand. Below this to a depth of 60 inches or more is a buried subsoil of dark yellowish brown extremely gravelly loam.

Included in this unit are areas in which the ashfall is more than 20 inches deep and areas in which bedrock is at a depth of 40 to 60 inches. Included areas make up about 10 percent of the total acreage.

Permeability of this Cattcreek soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash becomes stabilized by vegetation.

This unit is in areas used for woodland, recreation, wildlife habitat, and watershed.

This map unit is in capability subclass VIIe.

204—Cattcreek loamy sand, overblown, cold, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes and in cirque basins on mountains. It formed in pumice and volcanic ash over colluvium derived from andesite. Elevation is 4,000 to 5,300 feet. Native vegetation before the ashfall was mainly true firs and shrubs. The average annual precipitation is about 110 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 70 to 90 days.

This soil is overblown by ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is dark grayish brown and dark yellowish brown very cindery loamy sand 6 inches thick. The upper 9 inches of the subsoil is dark brown very cindery sand, and the lower 15 inches is strong brown extremely cindery sand. Below this to a depth of 60 inches or more is a buried subsoil of dark yellowish brown extremely gravelly loam.

Included in this unit are areas in which ashfall is more than 20 inches deep and areas where the original surface layer is exposed as a result of erosion. Also included are areas in which bedrock is at a depth of 40 to 60 inches and small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Cattcreek soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for woodland, recreation, wildlife habitat, and watershed.

This map unit is in capability subclass VIIe.

205—Cinnamon loamy sand, overblown, 2 to 30 percent slopes. This very deep, well drained soil is on terraces and back slopes of mountains. It formed in pyroclastic flows of volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,400 to 2,500 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 110 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown sandy loam 3 inches thick. The subsoil is dark yellowish brown and dark brown loamy sand 19 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of dark yellowish brown sandy loam.

Included in this unit are areas in which the ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Cinnamon soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used as wildlife habitat and recreation.

This map unit is in capability subclass IVs.

206—Colter loamy sand, overblown, 0 to 30 percent slopes. This very deep, well drained soil is on foot slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 6 inches thick. The substratum is white extremely cindery sand 27 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of very dark grayish brown and yellowish brown sandy loam.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is moderately rapid.

vailable water capacity is moderately high. Effective oting depth is 60 inches or more. The hazard of soil owing in the areas of ashfall is high. In areas where egetation was removed by the initial blast or buried by sh and waterflow became concentrated, gullies formed eadily. Sediment production will be high until the ash as been stabilized by vegetation.

This unit is in areas used for wildlife habitat and ecreation.

This map unit is in capability subclass VIe.

207—**Colter loamy sand, overblown, 30 to 65 ercent slopes.** This very deep, well drained soil is on ot slopes and back slopes of mountains. It formed in erially deposited volcanic ash and pumice. The native egetation before the ashfall was mainly mixed conifers d shrubs. Elevation is 2,800 to 4,000 feet. The erage annual precipitation is about 90 inches, the erage annual air temperature is about 39 degrees F, d the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches ck. Typically, the upper 15 inches is dark gray sandy am over a buried surface layer that is very dark ayish brown cindery sandy loam 6 inches thick. The bstratum is white extremely cindery sand 27 inches ck. Below this to a depth of 60 inches or more is a ried subsoil of very dark grayish brown and yellowish own sandy loam.

Included in this unit are areas in which ashfall is ore than 20 inches deep. Included areas make up out 10 percent of the total acreage.

Permeability of this Colter soil is moderately rapid. ailable water capacity is moderately high. Effective oting depth is 60 inches or more. The hazard of soil owing in the areas of ashfall is high. In areas where getation was removed by the initial blast or buried by h and waterflow became concentrated, gullies formed adily. Sediment production will be high until the ash s been stabilized by vegetation.

This unit is in areas used for wildlife habitat and creation.

This map unit is in capability subclass VIIe.

208—**Colter loamy sand, overblown, 65 to 90 rcent slopes.** This very deep, well drained soil is on ck slopes of mountains. It formed in aerially posited volcanic ash and pumice. The native getation before the ashfall was mainly mixed conifers d shrubs. Elevation is 2,800 to 4,000 feet. The erage annual precipitation is about 90 inches, the erage annual air temperature is about 39 degrees F, d the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 6 inches thick. The substratum is white extremely cindery sand 27 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of very dark grayish brown and yellowish brown sandy loam.

Included in this unit are areas in which ashfall is more than 20 inches deep and areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

209—**Colter loamy sand, overblown, cold, 0 to 30 percent slopes.** This very deep, well drained soil is on foot slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 6 inches thick. The substratum is white extremely cindery sand 27 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of very dark grayish brown and yellowish brown sandy loam.

Included in this unit are areas in which the ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIe.

210—Colter loamy sand, overblown, cold, 30 to 65 percent slopes. This very deep, well drained soil is on foot slopes and back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 7 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 6 inches thick. The substratum is white extremely cindery sand 27 inches thick. The next layer to a depth of 60 inches or more is a buried subsoil of very dark grayish brown and yellowish brown sandy loam.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

211—Colter loamy sand, overblown, cold, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 38 degrees F, and the average frost-free season is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 6 inches thick. The substratum is white extremely cindery sand 27 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of very dark grayish brown and yellowish brown sandy loam.

Included in this unit are areas where the original surface is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

212—Colter extremely cindery loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on foot slopes and back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period i 75 to 95 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand and the next 10 inches is dark gray very cindery sand and gravelly sand. Below this is a buried surface layer of very dark grayish brown cindery sandy loam 6 inches thick. The substratum is white extremely cindery sand 27 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of very dark grayish brown and yellowish brown sandy loam.

Included in this unit are areas in which cinderfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Colter soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

213—Colter, overblown, cold-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on foot slopes and back slopes of mountains. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Colter loamy sand, overblown, cold, 30 to 65 percent slopes, and about 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas in which the ashfall is more than 20 inches deep and areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Colter soil is very deep and well drained. It formed in aerially deposited volcanic ash and pumice. It is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 6 inches thick. The substratum is white extremely cindery sand 27 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of very dark grayish brown and yellowish brown sandy loam.

Permeability of this Colter soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

Rock outcrop consists of exposed areas of andesite and basalt.

This unit is in areas used for wildlife habitat and recreation.

The Colter soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

214—Cryandepts extremely cindery loamy sand, overblown, 45 to 120 percent slopes. These very deep, moderately well drained and well drained soils are on north-facing mountain slopes. They formed in aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed deciduous trees and shrubs. Elevation is 3,000 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 60 to 80 days.

No single profile is typical of these Cryandepts, but one commonly observed in the survey area is overblown by new cinderfall 4 to 20 inches thick. The upper 4 inches is light gray extremely cindery loamy sand, and the next 10 inches is dark gray very cindery sand and gravelly sand. The next layer is a buried surface layer that is very dark brown in the upper 13 inches and dark brown sandy loam in the lower 3 inches. Below this to a depth of 60 inches or more is a buried subsoil that is light gray extremely cindery sand stratified with sand and sandy loam.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of these Cryandepts is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall, and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIIe.

215—Elkprairie loamy sand, 5 to 30 percent slopes. This very deep, well drained soil is on broad mountaintops. It formed in volcanic ash and pumice over weathered volcanic ash and pumice. The native vegetation before the ashfall was mixed conifers and shrubs. Elevation is 2,600 to 4,700 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new ashfall 20 to 35 inches thick. Typically, the upper part of the surface layer is dark gray loamy sand 6 inches thick. The next part is dark gray cindery sand and cindery coarse sand 11 inches thick over very dark gray very cindery loamy sand 6 inches thick. Below this is a buried surface layer and subsoil. The buried surface layer and the upper part of the buried subsoil are very dark brown and brown fine sandy loam and cindery loam 13 inches thick. The lower part of the buried subsoil to a depth of 60 inches or more is yellowish brown loam.

Included in this unit are areas where the ashfall is more than 35 inches thick and areas of Tradedollar and

Vanson loamy sands, overblown, where the ashfall is less than 20 inches thick. Included areas make up about 20 percent of the total average.

Permeability of this Elkprairie soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial eruption or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIs.

216—Hatchet loamy sand, overblown, 65 to 90 percent slopes. This deep, well drained soil is on shoulder slopes and back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation before the ashfall was mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer of very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick. Fractured andesite is at a depth of 43 inches. Depth to andesite or basalt ranges from 40 to 60 inches.

Included in this unit are areas in which bedrock is at a depth of less than 40 inches. Also included are areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Hatchet soil is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial eruption or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

217—Hatchet loamy sand, overblown, cold, 30 to 65 percent slopes. This deep, well drained soil is on shoulder slopes and back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation before the ashfall was mixed conifers and shrubs. Elevation is 4,000 to 4,500 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer of very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick. Fractured andesite is at a depth o 43 inches. Depth to andesite or basalt ranges from 40 to 60 inches.

Included in this unit are areas in which the ashfall is more than 20 inches deep. Also included are outcrops of basalt or andesite, areas in which bedrock is at a depth of less than 40 inches, and soils that have slope of more than 65 percent. Included areas make up abo 10 percent of the total acreage.

Permeability of this Hatchet soil is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial eruption or buried by ash, and waterflow became concentrated, gullies formed readily Sediment production will be high until the ash has bee stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

218—Hatchet loamy sand, overblown, cold, 65 to 90 percent slopes. This deep, well drained soil is on back slopes of mountains. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. The native vegetation before the ashfall was mixed conifers and shrubs. Elevation 4,000 to 4,500 feet. The average annual precipitation about 105 inches, the average annual air temperature about 38 degrees F, and the average frost-free period 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inche thick. Typically, the upper 15 inches is dark gray loam sand over a buried surface layer of very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 8 inches thick. Fractured andesite is at a depth of 43 inches. Depth to andesite or basalt ranges from 40 to 60 inches.

Included in this unit are areas in which the ashfall is more than 20 inches deep and areas where the original surface layer is exposed as a result of erosion. Also included are outcrops of basalt or andesite, areas in which bedrock is at a depth of less than 40 inches, and soils that have slopes of less than 65 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Hatchet soil is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial eruption or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

219—Hatchet, overblown-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Hatchet extremely cindery loamy sand, overblown, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas in which bedrock is at a depth of more than 40 inches and areas in which cinderfall is more than 20 inches deep. Also included are areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Hatchet soil is moderately deep and well drained. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. It is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand. The next 10 inches is dark gray very cindery sandy loam and gravelly sand. Below this is a buried surface layer of very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly clay loam. Fractured andesite is at a depth of 37 inches. Depth to andesite or basalt ranges from 20 to 40 inches.

Permeability of this Hatchet soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. In areas where vegetation was removed by the initial eruption or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

Rock outcrop consists of exposed areas of andesite and basalt.

This unit is in areas used for wildlife habitat and recreation.

The Hatchet soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIs.

220—Hatchet, overblown, cold-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on shoulder slopes and back slopes of mountains. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 4,500 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Hatchet loamy sand, overblown, cold, 30 to 65 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

The Hatchet soil is deep and well drained. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam about 8 inches thick. Fractured andesite is at a depth of 43 inches. Depth to andesite or basalt ranges from 40 to 60 inches.

Permeability of this Hatchet soil is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches. The hazard of soil blowing in the ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

Rock outcrop consists of exposed areas of basalt and andesite.

This unit is in areas used for wildlife habitat and recreation.

The Hatchet soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

221—Hatchet, overblown cold-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 4,500 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

This unit is about 60 percent Hatchet extremely cindery loamy sand, overblown, cold, 65 to 90 percent slopes, and about 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas in which bedrock is at a depth of more than 40 inches and areas in which cinderfall is more than 20 inches deep. Also included are areas in which the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Hatchet soil is moderately deep and well drained. It formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand and the next 10 inches is dark gray very cindery sandy loam and gravelly sand. Below this is a buried surface layer that is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam and gravelly fine sandy loam, and the lower 10 inches is dark yellowish brown extremely cobbly loam. The substratum is yellowish brown extremely cobbly clay loam 3 inches thick. Fractured andesite is at a depth of 37 inches. Depth to andesite or basalt ranges from 20 to 40 inches.

Permeability of this Hatchet soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

Rock outcrop consists of exposed areas of basalt and andesite.

This unit is in areas used for wildlife habitat and recreation.

The Hatchet soil is in the capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

222—Histic Cryaquepts loamy sand, overblown, 0 to 5 percent slopes. These very deep, very poorly drained and poorly drained soils are in depressional areas on mountains and terraces. They formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly grasses, shrubs, and scattered conifers. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 60 to 80 days.

No single profile is typical of these Histic Cryaquepts but one commonly observed in the survey area has a mat of decomposing needles, leaves, and twigs 1 inch thick. The surface layer is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a mat of brown muck 13 inches thick. Below this is a buried surface layer of very dark loamy sand 8 inches thick. The subsoil is gray gravelly sandy loam 10 inches thick. The next 4 inches is a buried layer of very dark brown muck. The substratum to a depth of 60 inches or more is very dark brown gravelly coarse sand.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of these Histic Cryaquepts is moderate. Available water capacity is high. Effective rooting depth is limited by a seasonal high water table that extends from near the surface to a depth of 2.5 feet. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIw.

223—Lonestar loamy sand, overblown, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in volcanic ash and pumice over colluvium derived from basic igneous rock. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation s 2,800 to 4,500 feet. The average annual precipitation s about 125 inches, the average annual air temperature s about 40 degrees F, and the average frost-free season is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches hick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 2 inches thick. The upper 12 inches of the subsoil is dark brown cindery sandy loam, and the lower 4 inches is grayish brown oamy sand. The substratum is yellowish brown cindery oamy sand 10 inches thick. Below this to a depth of 60 nches or more is a buried subsoil of dark yellowish brown gravelly loam.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Lonestar soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

224—Lonestar loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on foot slopes and back slopes of mountains. It formed in volcanic ash and pumice over colluvium derived from basic igneous rock. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation s 2,800 to 4,500 feet. The average annual precipitation s about 125 inches, the average annual air temperature s about 40 degrees F, and the average frost-free period s 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches hick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam about 2 inches thick. The upper 12 inches of the subsoil is dark brown cindery sandy loam, and the lower 4 inches is grayish brown loamy sand. The substratum is yellowish brown cindery loamy sand 10 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of dark yellowish brown gravelly loam.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Lonestar soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

225—Lonestar loamy sand, overblown, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in volcanic ash and pumice over colluvium derived from basic igneous rock. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 7 inches thick. The upper 7 inches of the subsoil is dark brown cindery sandy loam, and the lower 4 inches is grayish brown loamy sand. The substratum is yellowish brown cindery loamy sand 10 inches thick. Below this to a depth of 60 inches or more is a buried subsoil of dark yellowish brown gravelly loam.

Included in this unit are areas in which ashfall is more than 20 inches deep and small areas of Rock outcrop. Also included are areas in which the original surface is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Lonestar soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

226—Minniepeak loamy sand, overblown, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand. Below this is a buried surface layer. The upper 3 inches is dark brown cindery sandy loam, the next 5 inches is black loamy sand, and the lower 4 inches is very dark gray very cindery sandy loam. The subsoil to a depth of 60 inches or more is light gray and dark brown extremely cindery sand and extremely cindery coarse sand.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Minniepeak soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

227—Minniepeak loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand. Below this is a buried surface layer. The upper 3 inches is dark brown cindery sandy loam, the next 5 inches is black loamy sand, and the lower 4 inches is very dark gray very cindery sandy loam. The subsoil to a depth of 60 inches or more is light gray and dark brown extremely cindery sand and extremely cindery coarse sand.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Minniepeak soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

228—Minniepeak extremely cindery loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the cinderfal was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand and the next 10 inches is dark gray very cindery sand. Below this is a buried surface layer. The upper 3 inches is dark brown cindery sandy loam, the next 5 inches is black loamy sand, and the lower 4 inches is very dark gray very cindery sandy loam. The subsoil to a depth of 60 inches or more is light gray and dark brown extremely cindery sand and extremely cindery coarse sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas in which slopes are less than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Minniepeak soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily.

Raveling of cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

229—Minniepeak extremely cindery loamy sand, overblown, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand and the next 10 inches is dark gray very cindery sand. Below this is a buried surface layer. The upper 3 inches is dark brown cindery sandy loam, the next 5 inches is black loamy sand, and the lower 4 inches is very dark gray very cindery sandy loam. The subsoil to a depth of 60 inches or more is light gray and dark brown extremely cindery sand and extremely cindery coarse sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas in which slopes are less than 65 percent. Also included are areas where the surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Minniepeak soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

230—Obscurity very bouldery sand, 0 to 30 percent slopes. This very deep, somewhat excessively drained soil is on broad fans and low terraces along major drainageways. It formed in mudflow material. The soil is barren. Elevation is 2,800 to 5,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the upper part of the soil is gray very bouldery sand 20 inches thick. Below this to a depth of 60 inches or more is dark gray very cobbly loamy sand and very cobbly sand.

Included in this unit are small areas of Forsyth and Shoestring soils. Also included are areas of soils that have a gravelly loamy sand surface layer. Included areas make up about 15 percent of the total acreage.

Permeability of this Obscurity soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate to high. The soil is subject to rare periods of flooding.

The unit has potential for use as woodland, recreation areas, and wildlife habitat.

This unit is presently undergoing primary plant succession. Invading plants will slowly provide a ground cover that will slow runoff from rain and snowmelt, reduce erosion, and provide food and cover for wildlife from adjacent areas. Eventually, established annual and perennial grasses, forbs, and shrubs will provide sufficient organic matter buildup and soil development for the artificial or natural regeneration of slow-growing timber stands.

This map unit is in capability subclass VIIs.

231—Panhandle extremely cindery loamy sand, 0 to 20 percent slopes. This very deep, well drained soil is on broad fans. It formed in cindery pyroclastic flow. This soil is characterized by numerous channels and depressional areas. It is barren. Elevation is 2,900 to 5,000 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 70 to 90 days.

Typically, the upper part of the soil is light gray extremely cindery loamy sand 10 inches thick. Below this to a depth of 60 inches or more is brown very cindery loamy sand.

Included in this unit are small areas of very gravelly loamy sand, very stony sand, and loamy sand. Included areas make up about 15 percent of the total acreage.

Permeability of this Panhandle soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is moderate to high.

This unit has potential for use for woodland, recreation, and wildlife habitat.

This unit is presently undergoing primary plant succession. Invading plants will slowly provide a ground cover that will slow runoff from rain and snowmelt, reduce erosion, and provide food and cover for wildlife from adjacent areas. Eventually, established annual and perennial grasses, forbs, and shrubs will provide sufficient organic matter buildup and soil development for the artificial or natural regeneration of slow-growing timber stands.

This map unit is in capability subclass VIIs.

232—Pelee extremely cindery loamy sand, overblown, 5 to 30 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand and the next 10 inches is dark gray very cindery sand. Below this is a buried surface layer that is very dark grayish brown sandy loam 7 inches thick. The upper part of the subsoil is dark gray very cindery coarse sand and light gray extremely cindery sand 25 inches thick, and the lower part to a depth of 60 inches or more is dark brown and very dark grayish brown sandy loam and dark brown loamy sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas that have slopes of more than 30 percent. Also included are areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Pelee soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

233—Pelee extremely cindery loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand 10 inches thick. Below this is a buried surface layer that is very dark grayish brown sandy loam 7 inches thick. The upper part of the subsoil is dark gray very cindery coarse sand and light gray extremely cindery sand 25 inches thick, and the lower part to a depth of 60 inches or more is dark brown and very dark grayish brown sandy loam and dark brown loamy sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Pelee soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

234—Pelee extremely cindery loamy sand, overblown, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in stratified, aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand 10 inches thick. Below this is a buried surface layer that is very dark grayish brown sandy loam 7 inches thick. The upper part of the subsoil is dark gray very cindery coarse sand and light gray extremely cindery sand 25 inches thick, and the lower part to a depth of 60 inches or more is dark brown and very dark grayish brown sandy loam and dark brown loamy sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas that have slopes of less than 65 percent. Also included are areas in which the surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Pelee soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

235—Pelee, overblown-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

This unit is about 60 percent Pelee extremely cindery loamy sand, overblown, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Pelee soil is very deep and well drained. It formed in stratified, aerially deposited volcanic ash and pumice. It is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand 10 inches. Below this is a buried surface layer that is very dark grayish brown sandy loam 7 inches thick. The upper part of the subsoil is dark gray very cindery coarse sand and light gray extremely cindery sand 25 inches thick, and the lower part to a depth of 60 inches or more is dark brown and very dark grayish brown sandy loam and dark brown loamy sand.

Permeability of this Pelee soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

Rock outcrop in this unit consists of exposed areas of basalt and andesite.

This unit is in areas used for wildlife habitat and recreation.

The Pelee soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

236—Polepatch loamy sand, overblown, 0 to 30 percent slopes. This very deep, somewhat excessively drained soil is on alluvial fans and terraces. It formed in lahar material with a mantle of volcanic ash. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 70 to 90 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown extremely bouldery loamy sand 12 inches thick. The underlying material to a depth of 60 inches or more is dark gray extremely cobbly sand and extremely stony coarse sand.

Included in this unit are areas in which ashfall is more than 20 inches deep and areas of Polepatch, cold, soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Polepatch soil is rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

237—Rock outcrop-Cattcreek, overblown, cold complex, 65 to 90 percent slopes. This map unit is on back slopes and in cirque basins on mountains. The native vegetation before the ashfall was mainly scattered true firs and shrubs. Elevation is 4,000 to 5,300 feet. The average annual precipitation is about 110 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 70 to 90 days.

This unit is about 60 percent Rock outcrop and 30

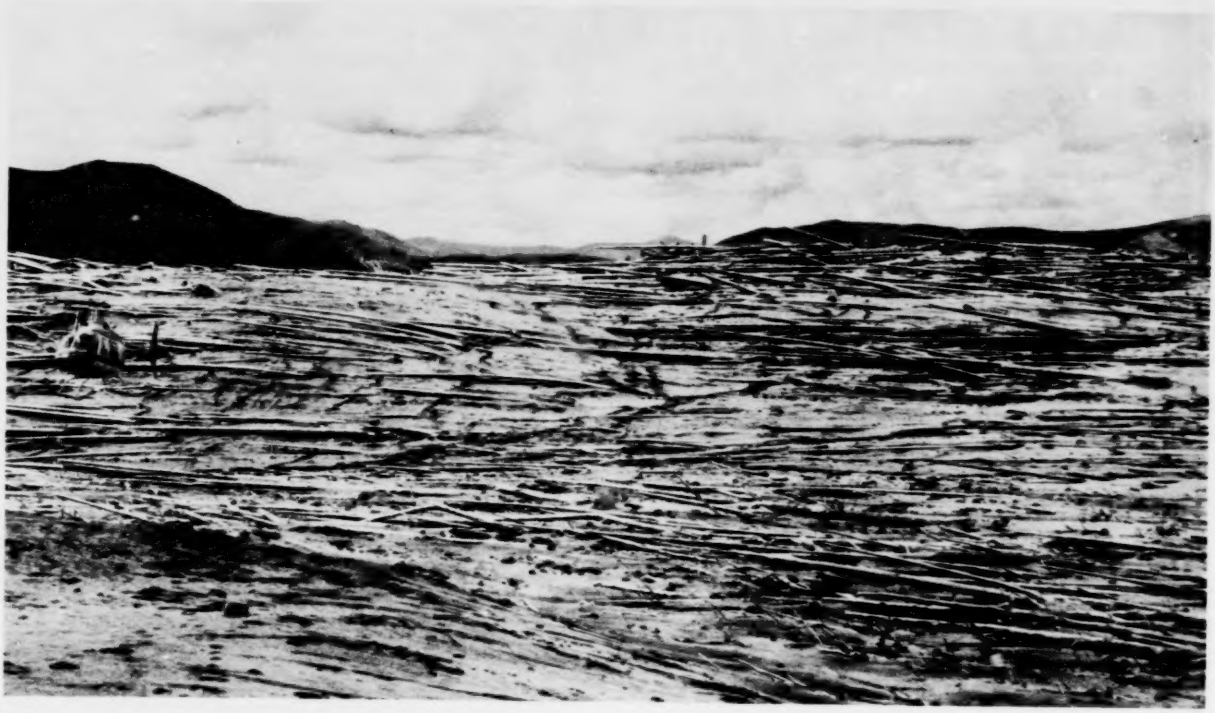


Figure 8.—An area of Shoestring loamy sand, overblown, 0 to 30 percent slopes. Note the orientation of the trees blown down by the initial blast.

percent Cattcreek loamy sand, overblown, cold, 65 to 90 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Rock outcrop consists of exposed areas of andesite.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

The Cattcreek soil is very deep and well drained. It formed in pumice and volcanic ash over residuum and colluvium derived from andesite. It is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is dark grayish brown and dark yellowish brown very cindery loamy sand 6 inches thick. The upper 9 inches of the subsoil is dark brown very cindery sand, and the lower 15 inches is strong brown extremely cindery sand. The next layer to a depth of 60 inches or more is a buried subsoil of dark yellowish brown extremely gravelly loam.

Permeability of this Cattcreek soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

The Rock outcrop is in capability subclass VIIIs, and the Cattcreek soil is in capability subclass VIIe.

238—Shoestring loamy sand, overblown, 0 to 30 percent slopes. This very deep, well drained soil is on terraces and terrace escarpments. It formed in aerially deposited volcanic ash and pumice over pyroclastic flow and lahar material. The native vegetation before the ashfall was mainly mixed conifers and shrubs (fig. 8). Elevation is 2,700 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 70 to 90 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand. The next 5 inches consists of a buried surface layer and the upper part of the subsoil, which are very dark gray fine sandy loam. The next 3 inches of the subsoil is dark gray very gravelly sand, and the lower 16 inches is dark brown sandy loam and very dark brown loamy sand. The substratum to a depth of 60 inches or more is dark grayish brown very cobbly sand and dark gray very gravelly sand.

Included in this unit are small areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Shoestring soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

239—Shoestring loamy sand, overblown, 50 to 90 percent slopes. This very deep, well drained soil is on terrace escarpments. It formed in aerially deposited volcanic ash and pumice over pyroclastic flow and lahar material. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,700 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 70 to 90 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand. The next 5 inches consists of a buried surface layer and the upper part of the subsoil, which are very dark gray fine sandy loam. The next 3 inches of the subsoil is dark gray very gravelly sand, and the lower 16 inches is dark brown sandy loam and very dark brown loamy sand. The substratum to a depth of 60 inches or more is dark grayish brown very cobbly sand and dark gray very gravelly sand.

Included in this unit are areas in which ashfall is more than 20 inches deep. Also included are small areas of Rock outcrop, Badland, and areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Shoestring soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

240—Sinnice extremely cindery loamy sand, overblown, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in aerially deposited layers of volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand and the next 10 inches is dark gray very cindery sand and gravelly sand. Below this is a buried layer that is light gray extremely cindery loamy sand 7 inches thick. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas in which slopes are more than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinders and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders have been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

241—Sinnice extremely cindery loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,300 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer. It is light gray extremely cindery loamy sand 7 inches thick. The upper 2 inches of the subsoil is dark brown fine sandy loam, and the lower 6 inches is very dark brown loamy sand. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas in which slopes are less than 30 percent. Also included are areas of Minniepeak soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinders and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders have been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

242—Sinnice extremely cindery loamy sand, overblown, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer that is light gray extremely cindery loamy sand 7 inches thick. The subsoil is dark brown fine sandy loam 2 inches thick over very dark brown loamy sand 6 inches thick. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep and areas in which slopes are less than 65 percent. Also included are areas where the original surface layer is exposed as a result of erosion and areas of Minniepeak soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinders and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders have been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

243—Sinnice extremely cindery loamy sand, overblown, cold, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer that is light gray extremely cindery loamy sand 7 inches thick. The subsoil is dark brown fine sandy loam 2 inches thick over very dark brown loamy sand 6 inches thick. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinders and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders have been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

244—Sinnice extremely cindery loamy sand, overblown, cold, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer that is light gray extremely cindery loamy sand 7 inches thick. The subsoil is dark brown fine sandy loam 2 inches thick over very dark brown loamy sand 6 inches. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are areas in which cinderfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinders and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders have been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

245—Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in layers of aerially deposited volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer of light gray extremely cindery loamy sand 7 inches thick. The subsoil is dark brown fine sandy loam 2 inches thick over very dark brown loamy sand 6 inches thick. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Included in this unit are areas in which slopes are less than 65 percent and areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Sinnice soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinders and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders have been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

246—Sinnice, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on cirque headwalls and back slopes of mountains. The native vegetation before cinderfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is 38 degrees F, and the average frost-free period is 75 to 90 days.

This unit is about 60 percent Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of Rubble land. Also included are areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Sinnice soil is very deep and well drained. It formed in layers of aerially deposited volcanic ash and pumice. It is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer that is light gray extremely cindery loamy sand and gravelly sand 10 inches thick. The subsoil is dark brown fine sandy loam 2 inches thick over very dark brown loamy sand 6 inches thick. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Permeability of this Sinnice soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinders and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders have been stabilized by vegetation.

Rock outcrop consists of exposed areas of andesite and basalt.

This unit is in areas used for wildlife habitat and recreation.

The Sinnice soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

247—Sinnice loamy sand, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 90 days.

This unit is about 60 percent Sinnice loamy sand, overblown, cold, 65 to 90 percent slopes, and about 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Sinnice soil is very deep and well drained. It formed in aerially deposited layers of volcanic ash and pumice. The soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer of light gray extremely cindery loamy sand 7 inches thick. The subsoil is dark brown fine sandy loam 2 inches thick over very dark brown loamy sand 6 inches thick. The substratum to a depth of 60 inches or more is light gray extremely cindery sand.

Permeability of this Sinnice soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial eruption or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

Rock outcrop consists of exposed areas of andesite and basalt.

This unit is in areas used for wildlife habitat and recreation.

The Sinnice soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

248—Studebaker very gravelly loamy sand, 0 to 20 percent slopes. This very deep, somewhat excessively drained soil is on foot slopes and toe slopes in highly irregular, dissected areas of valley fill. It formed in avalanche debris flow material. Slopes are mainly 2 to 20 percent, but in places the large areas of avalanche deposits can have slopes of as much as 100 percent. Debris consisting of logs is strewn across the landscape in an erratic pattern. The soil is barren. Elevation is 2,700 to 5,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is about 70 to 90 days.

Typically, the soil to a depth of 60 inches or more is dark gray very gravelly loamy sand. Color ranges from dusky red to very dark brown. In some areas texture throughout the profile is extremely gravelly loamy sand or extremely cobbly sand.

Included in this unit are small areas of soils that have an extremely cindery surface, mounds of extremely cindery loamy sand, and deep deposits of very fine sandy loam in depressional areas. Perennial and intermittent streams, flood plains, and depressional areas are included. Included areas make up about 20 percent of the total acreage.

Permeability of this soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit has potential for use for wildlife habitat, recreation, and woodland.

This unit is undergoing primary plant succession. Invading plants will slowly provide a ground cover that will slow runoff from rain and snowmelt, reduce erosion, and provide food and cover for wildlife from adjacent areas. Eventually, established annual and perennial grasses, forbs, and shrubs will provide sufficient organic matter buildup and soil development for the artificial or natural regeneration of slow-growing timber stands.

This map unit is in capability subclass VIIs.

249—Swift loamy sand, overblown, 2 to 30 percent slopes. This very deep, well drained soil is on side slopes and ridgetops of mountains. It formed in colluvium derived dominantly from volcanic ash and basic igneous rock with a mantle of volcanic ash and cinders. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,500 to 2,800 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 100 to 120 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown cindery sandy loam 12 inches thick. The upper 15 inches of the subsoil is dark yellowish brown very cindery loam, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Included in this unit are areas in which ashfall is more than 20 inches deep and areas of Rock outcrop. Also included are areas in which slopes are more than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Swift soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass IVe.

250—Swift, overblown-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on side slopes of mountains. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,000 to 2,800 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 100 to 120 days.

This unit is about 60 percent Swift loamy sand, overblown, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Swift soil is very deep and well drained. It formed in colluvium derived dominantly from volcanic ash and basic igneous rock with a mantle of volcanic ash and cinders. The soil is overblown by new ashfall 4 to 20 inches. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer of very dark grayish brown cindery sandy loam 12 inches thick. The upper 15 inches of the subsoil is dark yellowish brown very cindery loam, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Permeability of this Swift soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

Rock outcrop consists of exposed areas of dominantly andesite and basalt.

This unit is in areas used for wildlife habitat and recreation.

The Swift soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

251—Tradedollar loamy sand, overblown, 0 to 30 percent slopes. This very deep, well drained soil is on ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam. Below this to a depth of 60 inches or more is dark brown extremely cindery loamy sand and strong brown extremely cindery sand.

Included in this unit are areas in which ashfall is more than 20 inches deep and areas in which slopes are more than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

252—Tradedollar loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam. Below this to a depth of 60 inches or more is dark brown extremely cindery loamy sand and strong brown extremely cindery sand.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

253—Tradedollar loamy sand, overblown, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes and ridgetops of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,400 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam. Below this to a depth of 60 inches or more is dark brown extremely cindery loamy sand and strong brown extremely cindery sand.

Included in this unit are areas of Rock outcrop and areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

254—Tradedollar loamy sand, overblown, warm, 0 to 30 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam. Below this to a depth of 60 inches or more is dark brown extremely cindery loamy sand and strong brown extremely cindery sand.

Included in this unit are areas in which ashfall is more than 20 inches deep and areas in which slopes are more than 30 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIe.

255—Tradedollar loamy sand, overblown, warm, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam. Below this to a depth of 60 inches or more is dark brown extremely cindery loamy sand and strong brown extremely cindery sand.

Included in this unit are areas in which ashfall is more than 20 inches deep. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

256—Tradedollar loamy sand, overblown, warm, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in aerially deposited volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is very dark grayish brown sandy loam 5 inches thick. The upper 21 inches of the subsoil is dark brown cindery sandy loam. Below this to a depth of 60 inches or more is dark brown extremely cindery loamy sand and strong brown extremely cindery sand.

Included in this unit are areas in which ashfall is more than 20 inches deep. Also included are areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Tradedollar soil is moderately rapid. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

257—Vanson loamy sand, overblown, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Included in this unit are areas in which ashfall is more than 20 inches deep. Also included are small areas of Rock outcrop and Vanson soils that are 40 to 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

258—Vanson loamy sand, overblown, 30 to 65 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer that is dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Included in this unit are areas in which ashfall is more than 20 inches deep and Vanson soils that are 40 to 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial blast or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

259—Vanson loamy sand, overblown, 65 to 90 percent slopes. This very deep, well drained soil is on back slopes of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer of dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Included in this unit are areas in which ashfall is more than 20 inches deep and Vanson soils that are 40 to 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial eruption or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

260—Vanson loamy sand, overblown, cold, 5 to 30 percent slopes. This very deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer of dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Included in this unit are areas in which ashfall is more than 20 inches deep and Vanson soils that are 40 to 60 inches deep to bedrock. Also included are areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial eruption or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIs.

261—Vanson loamy sand, overblown, cold, 30 to 65 percent slopes. This very deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer of dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Included in this unit are areas in which ashfall is more than 20 inches deep and Vanson soils that are 40 to 60 inches deep to bedrock. Included areas make up about 10 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial eruption or buried by ash and waterflow became concentrated, gullies formed readily. Sediment production will be high until the ash has been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

262—Vanson extremely cindery loamy sand, overblown, 65 to 90 percent slopes. This very deep, well drained soil is on foot slopes and ridgetops of mountains. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average annual frost-free period is 75 to 95 days.

This soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer that is dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Included in this unit are areas of Vanson soils that are 40 to 60 inches deep to bedrock. Also included are areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial eruption or buried by cinders and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders have been stabilized by vegetation.

This unit is in areas used for wildlife habitat and recreation.

This map unit is in capability subclass VIIe.

263—Vanson, overblown-Rock outcrop complex, 30 to 65 percent slopes. This map unit is on back slopes of mountains. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Vanson extremely cindery loamy sand, overblown, 30 to 65 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of Vanson soils that are 40 to 60 inches deep to bedrock.

The Vanson soil is very deep and well drained. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer of dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

Rock outcrop consists of exposed areas of andesite and basalt.

This unit is in areas used for wildlife habitat and recreation.

The Vanson soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

264—Vanson, overblown-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation before the ashfall was mainly mixed conifers and shrubs. Elevation is 2,800 to 4,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Vanson loamy sand, overblown, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas in which bedrock is at a depth of 40 to 60 inches. Also included are areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Vanson soil is very deep and well drained. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. This soil is overblown by new ashfall 4 to 20 inches thick. Typically, the upper 15 inches is dark gray loamy sand over a buried surface layer of dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. The hazard of soil blowing in the areas of ashfall is high. In areas where the vegetation was removed by the initial eruption or buried by ashfall and waterflow became concentrated, gullies formed readily. Sediment production will be high until the cinders become stabilized by vegetation.

Rock outcrop consists of exposed areas of andesite and basalt.

This unit is in areas used for wildlife habitat and recreation.

The Vanson soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

265—Vanson, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes. This map unit is on back slopes of mountains. The native vegetation before the cinderfall was mainly mixed conifers and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 38 degrees F, and the average frost-free period is 75 to 95 days.

This unit is about 60 percent Vanson extremely cindery loamy sand, overblown, 65 to 90 percent slopes, and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of Vanson soils that are 40 to 60 inches deep to bedrock and areas where slopes are less than 65 percent. Also included are areas where the original surface layer is exposed as a result of erosion. Included areas make up about 10 percent of the total acreage.

The Vanson soil is very deep and well drained. It formed in colluvium derived dominantly from igneous rock mixed with volcanic ash and pumice. The soil is overblown by new cinderfall 4 to 20 inches thick. Typically, the upper 4 inches is light gray extremely cindery loamy sand over dark gray very cindery sand and gravelly sand 10 inches thick. Below this is a buried surface layer that is dark brown sandy loam 9 inches thick. The upper 7 inches of the subsoil is dark yellowish brown sandy loam, the next 8 inches is dark brown loamy sand, and the lower part to a depth of 60 inches or more is dark yellowish brown very gravelly sandy loam.

Permeability of this Vanson soil is moderate. Available water capacity is moderately high. Effective rooting depth is 60 inches or more. In areas where the vegetation was removed by the initial blast or buried by cinderfall and waterflow became concentrated, gullies formed readily. Raveling of the cinders downslope and sediment production will be high until the cinders become stabilized by vegetation.

Rock outcrop consists of exposed areas of andesite and basalt.

This unit is in areas used for wildlife habitat and recreation.

The Vanson soil is in capability subclass VIIe, and the Rock outcrop is in capability subclass VIIIs.

266—Wakepish very gravelly sandy loam, 0 to 30 rcent slopes. This very deep, somewhat excessively ained soil is on fans and low terraces along ainageways. It formed in mudflow material. The soil is rren. Elevation is 1,600 to 2,800 feet. The average nual precipitation is about 135 inches, the average nual air temperature is about 42 degrees F, and the erage frost-free period is about 90 to 110 days.

Typically, the soil is dark gray gravelly sandy loam 30 hes thick over dark gray very gravelly loamy sand d very gravelly sand that extends to a depth of 60 hes or more.

Included in this unit are small areas of very bouldery my sand, very gravelly loamy sand, and soils that ve been eroded to bedrock. Included areas make up out 15 percent of the total acreage.

Permeability of this Wakepish soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate to high. This soil is subject to frequent, brief periods of flooding during May through June.

This unit has potential for use as woodland, recreation, and wildlife habitat.

This unit is presently undergoing primary plant succession. Invading plants will slowly provide a ground cover that will slow runoff from rain and snowmelt, reduce erosion, and provide food and cover for certain wildlife from adjacent areas. Eventually, established annual and perennial grasses, forbs, and shrubs will provide sufficient organic matter buildup and soil development for the artificial or natural regeneration of slow-growing timber stands.

This map unit is in capability subclass VIIs.

Prime Farmland

In this section, prime farmland is defined and discussed and the prime farmland soils in this survey area are listed.

Prime farmland is of major importance in providing the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, seed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. Adequate moisture and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pastureland, or woodland, or they may be in other uses. They either are used for producing food and fiber or are available for these uses.

Prime farmland is areas where the soils are well drained, are more than 40 inches deep, and have a dependable and adequate supply of moisture from precipitation or irrigation. Slopes generally are less than 8 percent. It has few or no stones and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. It also has a favorable temperature and length of growing season and an acceptable level of acidity or alkalinity. For more detailed information on the criteria for prime farmland consult the local office of the Soil Conservation Service.

About 11,135 acres, or 3 percent of the survey area, meets the soil requirements for prime farmland. Areas of prime farmland are on benches and terraces along the Columbia River, in the southern part of the area. A major part of the prime farmland remains in second growth stands of Douglas fir. Cleared areas are used for orchards, mainly for producing apples and pears. Other areas of prime farmland are used for pasture and hay crops.

The loss of some prime farmland to urban uses has been a recent trend in land use in some parts of the area. This puts pressure on marginal lands, which generally are more erodible, are difficult to cultivate, and commonly are less productive.

The soil map units that make up the prime farmland in this survey area are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in tables 4a and 4b. The location is shown on the detailed soil map in the back of this publication. The soil characteristics that affect use and management are described in the section "Detailed Soil Map Units."

The following map units meet the soil requirements for prime farmland.

21	Chemawa loam, 2 to 8 percent slopes
42	Haplumbrepts, 0 to 3 percent slopes
64	McBee silt loam
65	McDoug silt loam
73	Mossyrock silt loam, 2 to 5 percent slopes
103	Skamania very fine sandy loam, 0 to 8 percent slopes
120	Stabler loam, 0 to 8 percent slopes
157	Washougal loam, 0 to 3 percent slopes
158	Washougal gravelly loam, 2 to 8 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Steven Nissley, soil conservationist, Soil Conservation Service, helped to prepare this section.

General management needed for crops and for hay and pasture is suggested in this section. The system of land capability classification used by the Soil Conservation Service is explained, and the estimated yields of the main crops and hay and pasture plants commonly grown are listed for each soil.

Agriculture in the survey area is limited by mountainous terrain, steepness of slope, and a short growing season over much of the area. Gently sloping terraces along the Columbia River Gorge and the lower valleys of the Wind and Washougal Rivers are the main agricultural areas.

The total cropland in the survey area is about 3,250 acres. Of this, about 450 acres is in orchards and about 2,750 acres is hayland and pastureland. In addition to the cropland, a small acreage is used for growing small grain and grapes for wine. About 890 acres is used for unimproved pasture.

The orchards in the survey area are mainly in the Underwood Hill area. Apples and pears are the main crops. The average annual precipitation in this area is 40 to 45 inches. These orchards are not irrigated. Tree rows commonly are oriented up and down the slope. This allows cold air drainage down the slope, but it also allows unrestricted flow of water. Properly managed and maintained cover crops are needed to control soil erosion. In some areas, tree rows and farm roads concentrate the flow of water, which causes gully erosion.

The hayland and pastureland is along the entire length of the Columbia River Gorge, where the slope is gradual enough for cultivation. The average annual precipitation is 40 to 80 inches. As precipitation increases, so does soil acidity. Lime is needed on legumes for maximum production. Alfalfa, alsike clover, red clover, birdsfoot trefoil, and big trefoil are legumes that are adapted to this area. Adapted grasses include orchardgrass, tall fescue, timothy, smooth brome, meadow foxtail, and reed canarygrass.

The main conservation problem associated with hayland and pastureland is soil erosion caused by runoff following reseeding operations and from concentrated flow of water in areas where the plant cover is inadequate. Soil erosion can be reduced by using no-till farming, maintaining residue on the surface, and properly fertilizing when reseeding. Other practices include installing tile drainage systems and shaping and seeding waterways.

Pastureland requires proper grazing to maintain desirable plant species. Grazing should be deferred until plants are at least 8 inches tall. Plants should not be grazed any lower than 4 inches. The regrowth period should be keyed to the needs of the plants. Also, grazing should be avoided when the field is excessively wet or before a reseeded stand is fully established. Pastures should be clipped and dragged at least once each summer.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils generally are grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. The capability subclass is identified in the description of each soil map unit in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Gregory S. Fisher, forester, Soil Conservation Service, helped to write this section.

Most of this survey area is forest land. All privately owned forest land in the county is included in the survey area. The survey area also includes about 120,000 acres of intermingled state *(9)* and federal woodland in the northwestern part of the county.

Differences in climate and topography in the survey area result in a number of different forest types. Douglas fir, ponderosa pine, grand fir, red alder, Oregon white oak, and bigleaf maple grow at the lower elevations, where the annual precipitation is lower. Western hemlock, western redcedar, Pacific silver fir, noble fir, and subalpine fir grow at the higher elevations, where the annual precipitation is higher. Woodland productivity generally is highest on the soils at the lower elevations.

The harvesting and processing of wood products is important to the local economy. Products include lumber, poles, piling, plywood, Christmas trees, and firewood. Large sawmill and plywood manufacturing facilities and numerous small, privately owned sawmills are located in the area.

Soil surveys are becoming increasingly more important to forest land owners as they come to realize that the success or failure of many management practices can be predicted beforehand by knowing the properties of the various soils on which trees grow. Each map unit described in the section "Detailed Soil Map Units" that is suitable for producing wood crops contains information on potential productivity, limitations for harvesting timber, concerns for establishing and producing wood crops, and the common tree species and forest understory plants. The methods and procedures used by foresters and soil scientists to develop the information for each map unit description are contained in the Soil Conservation Service National Forestry Manual *(20)* and the State of Washington Forest Land Grading Procedures Handbook *(9)*.

Forests surrounding Mount St. Helens were severely impacted by the May 18, 1980, eruption. About 67,000 acres of Federal and private land in the northern part of the survey area was affected directly by the lateral blast of the eruption. The approximate acreage of forest land affected by the blast is as follows: timber blowdown, 17,900 acres; standing damaged timber, 4,160 acres; little if any vegetation, 41,000 acres; new lakes, 1,200 acres; and Mount St. Helens and old Spirit Lake, 2,550 acres *(21)*.

Soils on which the vegetation was completely destroyed and areas that had been recently clearcut prior to the eruption support little if any vegetation at present.

Within the blast area, all vegetation was killed, blown down, or otherwise destroyed. The Forest Service estimated that the total dead and downed timber on federal forest land was about 1.1 billion board feet. The volume of affected timber in the survey area is somewhat less because the blast area extends outside of this soil survey area. No estimates for the volume of affected timber are available for the private land within the survey area.

The impact on the vegetation outside the blast area varies with the amount of tephra received from the initial and subsequent eruptions. Trees and shrubs appear to have suffered little negative impact. The effects on forbs, grasses, and other low growing plants vary with the amount of tephra received and the ability of the plants to push up through the tephra.

Various alternatives for salvaging timber and the timing of operations for salvage were considered. Proposals for wilderness and interpretive areas affected the amount of timber that could be salvaged. The Forest Service estimated that 580 million board feet was accessible for salvage on Federal land outside of proposed wilderness and interpretive areas; however, for each year of lapsed time after the first 4 or 5 years following the blast, it was estimated that volume losses would be about 50 million board feet per year *(5)*. No estimates are available for the volume or time frames of timber salvage on private land within the survey area.

The eruptions of Mount St. Helens changed many of the original soil-woodland interpretations, especially within the blast and mudflow areas. Some of those changes were predicted, and others require short- and long-term monitoring and observation. Trees were killed and left standing, blown down, or otherwise destroyed within the blast area. Most of the trees in the mudflow area were destroyed.

No site indexes are given for the posteruption map units listed on table 6a; however, the site indexes for the areas of ashfall and cinderfall are probably still valid because the posteruption soils are similar to the preeruption soils. Short-term productivity will be drastically reduced where tree seedling roots cannot be placed in or near the underlying preeruption soils. The new deposits of mudflow material and tephra lack some nutrients, organic matter, mycorrhizal fungi, and structure of developed soils that are necessary for optimum tree growth.

Recommendations for trees to plant and the ratings for equipment limitation, seedling mortality, windthrow hazard, and plant competition are given in tables 6a and 6b. These ratings are for areas where the roots of tree seedlings can be placed partially in preeruption soil material.

Natural regeneration of tree seedlings is limited by the proximity of seed sources from trees unaffected by the blast. The presence of droughty, nutrient-deficient tephra and its tendency to crust at the surface when dry adversely affects the success of natural regeneration even in areas where the accumulations of tephra are as thin as 4 inches, unless it is removed or incorporated into the preeruption soil material.

Accumulations of new tephra less than 4 inches thick should have little effect on the survival of planted tree seedlings; accumulations more than 4 inches thick result in severe seedling mortality.

Various methods of site preparation can be used to reduce seedling mortality on the overblown map units. One method is to use an auger 6 inches in diameter to bore down to preeruption soil material and mix the soil with the new tephra prior to planting trees. Where slopes are less than about 25 percent, tracked equipment with various types of blades can be operated across slope to wholly or partially remove the new tephra. Sun shades placed on the south side of the planted seedlings provide some protection from direct and reflected sunlight, particularly where slopes are more than 60 percent.

Extensive tree planting programs are being implemented on land within the blast areas, except for the Mount St. Helens National Volcanic Monument. Douglas fir and noble fir are two of the primary species being planted—Douglas fir on soils at less than 3,500 feet elevation and noble fir on soils at more than 3,500 feet. The Douglas fir seedlings being planted are mainly 2-0 stock with a large fibrous root system 10 to 12 inches long. The natural vegetation that was on the overblown map units prior to the eruption is given in the "Common trees" column in table 6b.

Trees planted in the debris flow and mudflow material will be much harder to establish. Numerous plantings of rooted black cottonwood cuttings and unrooted native willow cuttings have been completed in mudflow areas on Federal lands to evaluate seedling mortality. Numerous trial plantings of various coniferous seedlings also have been completed in the thicker tephra deposits on Federal lands for the same purpose. The success of those plantings in the mudflow and thicker tephra deposits should be evaluated before large scale tree planting programs are developed for these areas.

Tables 6a and 6b summarize the forestry information given in the map unit descriptions and can serve as a quick reference for important woodland interpretations. Following is a brief description of each of the columns in the tables.

Ordination symbol.—The ordination symbol is based on a uniform system for labeling individual soils to determine the potential productivity and the principal soil properties in relation to any hazards or limitations of that soil *(20)*. The first element of the ordination symbol is a number that denotes potential productivity in terms of cubic meters of wood per hectare per year for the indicator tree species. The indicator species is a tree that commonly grows on the particular soil and is the most productive one; for example, a number 1 would mean 1 cubic meter of wood per hectare per year (14.3 cubic feet per acre per year) and 10 would mean the soil has potential for producing 10 cubic meters of wood per hectare per year (143 cubic feet per acre per year). Cubic feet multiplied by 5 gives the approximate growth volume in Scribner board feet. The second element of the symbol, a letter, indicates the major kind of soil characteristic that limits tree growth or management. The letter *X* indicates restrictions because of stones or rocks; *W*, excessive water, either seasonally or year-round, in or on the soil; *D*, restricted rooting depth; *S*, sandy soils; *F*, soils with coarse fragments that are more than 0.1 inch and less than 10 inches in diameter; and *R*, relief or steepness of slope. The letter *A* indicates that there are few, if any, limitations for use or management as forest land. If a soil has more than one limitation, the letter denoting the most limiting characteristic of the soil is used.

Each soil is also rated for a number of factors to be considered in management. Slight, moderate, and severe are used to indicate the degree of major soil limitations or management problems. For each moderate or severe rating, a sentence in the applicable soil map unit explains the soil factors that are the basis for that rating.

Equipment limitation ratings refer to the limits on the use of equipment, year-round or seasonally, as a result of soil characteristics. A rating of *slight* indicates that use of equipment is not normally restricted in kind or time of year because of soil factors; *moderate* indicates a short seasonal limitation because of soil wetness, a fluctuating water table, or some other factor; and *severe* indicates a seasonal limitation, a need for special equipment (such as a cable yarding system), or a hazard in the use of equipment. Steepness of slope, soil wetness, and stoniness or rockiness are the main factors that cause equipment limitations. As slope gradient and length increase, it becomes more difficult to use wheeled equipment, commonly where slopes are 25 to 35 percent. On steeper slopes, tracked equipment must be used, commonly where slopes are 35 to 45 percent. On the steepest slopes even tracked equipment cannot be operated safely and more sophisticated systems must be used. Soil wetness, especially where the soils are fine textured, can severely limit the use of equipment, making harvesting practical only during dry summer months.

Seedling mortality ratings refer to the probability of death of naturally occurring or planted tree seedlings as influenced by kinds of soil or topographic conditions. Plant competition is not considered in the ratings. The ratings apply to healthy, dormant live seedlings from good stock that are properly planted or to naturally established seedlings that germinate during a period of sufficient soil moisture. *Slight* indicates that no problem is expected under usual conditions; *moderate* indicates that some problems of mortality can be expected and that extra precautions are advisable; and *severe* indicates that mortality will be high and that extra precautions are essential for successful reforestation. Soil wetness and droughtiness of the surface layer, especially on south- or southwest-facing slopes or on ridgetops, account for seedling mortality. To offset these, larger than usual planting stock, special site preparation, surface drainage, or reinforcement planting may be needed.

Windthrow hazard. Ratings of windthrow hazard consider the soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees are not normally blown down by wind; strong winds may break trees but not uproot them; *moderate*, that an occasional tree may be blown down during periods of excessive wetness combined with moderate or strong winds; and *severe*, that many trees can be expected to be blown down during periods of soil wetness combined with moderate or strong winds. Restricted rooting depth because of a high water table, limited depth to bedrock, an impervious layer, or poor anchoring of roots because of a loose surface layer and subsoil are responsible for windthrow or tree tipover. Moderate and severe ratings indicate the need for more care in thinning the edges of woodland stands, a plan calling for periodic salvage of windthrown trees, and an adequate road and trail system to allow for salvage operations.

Plant competition ratings refer to the likelihood of the invasion or growth of undesirable brushy plants when openings are made in the tree canopy. A *slight* rating indicates that unwanted brushy plants are not likely to delay natural reforestation and that planted seedlings have good prospects for development without undue competition; *moderate* indicates that competition will delay natural or planted reforestation; and *severe* indicates that competition can be expected to prevent natural or planted reforestation. The plant competition ratings in tables 6a and 6b correspond to the first tree species listed for each soil in the "common trees" column. Favorable climate and soil characteristics account for plant competition problems. In many instances, the key to predicting brush competition problems is the quantity and proximity of seed sources or the quantity of unwanted brush rootstock that will resprout after harvest. Moderate and severe ratings indicate the need for careful and thorough postharvest cleanup in preparation for reforestation and the possibility of mechanically or chemically treating brush to retard its growth and allow seedlings to develop.

Common trees are listed in the general order of decreasing occurrence in the map unit. Listed species occur throughout the range of the map unit. The detailed map unit descriptions indicate the common trees that are principal species (occupying at least 10 percent of the map unit) and minor species (occupying less than 10 percent).

Site index refers to the height (in feet) of the larger trees (dominant and codominant) when they are 50 years old. Generally, the higher the site index, the higher the production of wood fiber. A site index for a species on one map unit should only be compared to site indexes on other map units for the same tree species. A site index was not given to any minor species or, because of lack of data or a suitable site index publication, to certain principal species *(4, 9, 10, 11, 14, 15, 16, 24, 27)*.

Trees to plant are those that are planted for reforestation or, if suitable conditions exist, are allowed to regenerate naturally. Species listed are suited to the soils and can produce a commercial wood crop. Desired product, landscape position, and personal preference are three factors among many that can influence the choice of adapted trees to use in reforestation.

Recreation

The survey area offers diverse recreational activity such as boating, swimming, and fishing on its many rivers, lakes, and reservoirs. Camping, hiking, mountain climbing, and hunting are also popular. The Wind River Winter Sports Area is maintained by the Forest Service and provides marked trails for cross-country skiing and snowmobiling.

Recreational use of the area was severely affected by the eruption of Mount St. Helens on May 18, 1980. In 1979, the area provided an estimated 480,000 recreation-visitor days for all recreation activities *(19)*. The loss of camping grounds, trails, backpacking areas, and fishing and hunting opportunities will be slowly recovered in the blast area. Recreational use of the blast area is expected to increase because of the visitor centers that have been built, volcano viewpoints, and access to unique geological features.

The soils of the survey area are rated in tables 7a and 7b according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In tables 7a and 7b, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties generally are favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in tables 7a and 7b can be supplemented by other information in this survey; for example, interpretations for dwellings without basements and for local roads and streets in tables 9a and 9b and interpretations for septic tank absorption fields in tables 10a and 10b.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Terry L. Aho, soil scientist, Soil Conservation Service, helped to te this section.

Wide variations in elevation, climate, and geological atures in the survey area result in a diversity of plant ommunities and wildlife habitat. This diversity in turn upports a wide variety of fish and wildlife, providing creation and a source of income. To maintain this aluable fish and wildlife resource, an understanding of ildlife habitat and a well planned conservation program e necessary.

The essential elements of wildlife habitat are food, over, and water. The quality, quantity, and terspersion of these elements directly influences both ildlife populations and species diversity. This section scusses some of the principal kinds of wildlife in the ea, the general kinds of habitat required by these ecies, and the major soils that support these kinds of bitat.

In this survey area, rivers and streams provide bitat for both migratory and resident fish. The olumbia, Wind, and Washougal Rivers support the ajor runs of salmon, steelhead, smelt, and shad. ese streams also support populations of sturgeon, itefish, bass, and trout. Many smaller tributaries ovide spawning and rearing areas for salmon and eelhead. In addition, they provide habitat for muskrats, er otters, beavers, waterfowl, bald eagles, and prey. Bald eagles arrive along the Columbia River d its tributaries in November, when salmon are awning. They feed on spawned-out salmon and elt, which arrive in spring. The osprey also fish the ers and streams for their food supply.

Reservoirs and lakes provide habitat for resident pulations of trout, bass, sunfish, perch, and crappie. ey provide feeding and resting areas for migratory terfowl, such as snow geese, mallards, pintails, teal, d mergansers, and to a limited extent whistling ans, great blue heron, and gulls *(8)*.

Flood plains and river terraces provide riparian bitat for amphibians, reptiles, rodents, weasels, ccoon, muskrats, skunks, and numerous species of gbirds. The Pilchuck, Skamania, and Washougal s are examples of soils on flood plains and river aces.

High terraces above the flood plains provide nland habitat with brushy cover. These areas port populations of pheasant, California quail, adowlarks, owls, and various other songbirds and s of prey. These areas also provide habitat for bits, rodents, opossum, coyotes, and deer. Examples of soils on these terraces are those of the Chemawa, Hesson, Mossyrock, and Stabler series. Chemawa soils in the southeastern part of the survey area, near Underwood Mountain, are used for orchards. Mossyrock and Hesson soils in the southwestern part of the county are used for small grain and Christmas tree plantations and as hayland and pastureland. Stabler soils in the Upper Wind River Valley are used as pastureland.

The mountainous, timbered areas associated with forestry activities support a variety of wildlife. Big game species include black-tailed deer, Roosevelt elk, black bear, cougar, and bobcat. The Mount Margaret area supports a small population of mountain goats. Smaller species in forested habitat include coyotes, rabbits, squirrels, chipmunks, and mountain beaver. The bird population includes ruffed and blue grouse, Steller's jay, owls, turkey vultures, and various other species of bird. The Aschoff, Cattcreek, Swift, Sinnice, Tradedollar, and Zygore soils are examples of soils that provide areas of forest wildlife habitat.

As a general rule, agricultural land can be improved for wildlife by providing as much cover as possible. Such practices as planting odd areas, hedgerows, and windbreaks, protecting riparian vegetation, properly grazing pastures, and protecting land from soil erosion will provide food and cover for wildlife. Fish populations will also benefit from increased riparian vegetation and reduced in-stream sedimentation.

Several species of wildlife are dependent on old-growth forest land for all or part of their life cycle; however, many species, including deer and elk, relish the grasses, forbs, and shrubs that proliferate in forest openings. Small, irregularly shaped clearcuts are valuable feeding areas for 10 to 20 years following logging. Forest management plans should include provisions to (1) protect riparian vegetation and a specified number of snags; (2) prevent erosion and stream sedimentation; and (3) reseed all disturbed areas such as roads, skid trails, and landings with a grass and legume mixture. The May 18, 1980, eruption of Mount St. Helens affected both fish and wildlife. An estimated 67,000 acres of wildlife habitat, 1,700 acres of lakes, and 60 miles of rivers and streams in the survey area were destroyed or adversely affected by the eruption.

Most of the wildlife habitat was destroyed by the lateral blast of the eruption. An estimated 2,070 black-tailed deer, 900 elk, 90 black bear, and 23 mountain goats were killed in Skamania County as a direct result of the eruption. Other wildlife lost in the blast were numerous furbearers, small mammals, birds, reptiles, and amphibians.

Lakes and streams within the blast area of Skamania County were severely impacted by the May 18, 1980, eruption. Mudflows and pyroclastic flows entered and completely covered the North Fork of the Toutle River. Mudflows also severely affected the South Fork of the Toutle River, Muddy River, Pine Creek, and Smith Creek. Mudflows and debris traveling down the Muddy River and Pine Creek also slightly affected the Swift Reservoir.

Fish in Spirit Lake, St. Helens Lake, and the smaller lakes were killed by the eruption, either by suffocation, by extreme heat, or as a result of gill abrasion caused by large amounts of ash in the water.

The recovery and rehabilitation of wildlife habitat affected by the eruption will take many years. About 3 years after the eruption, natural revegetation was becoming established along the fringe of the blast areas. It includes fireweed, grasses, and small shrubby plants. Erosion control measures of grass seedings, cottonwood plantings, and reforestation efforts scattered throughout the blast area are also a step toward the recovery of the wildlife habitat. Efforts by governmental agencies and private industry to revegetate the blast area continue.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the preeruption soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficu and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat impractical or impossible.

The elements of wildlife habitat are described in th following paragraphs.

Grain and seed crops are domestic grains and seed producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are oats and barley.

Grasses and legumes are domestic perennial grasse and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are dep of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are western brackenfern, western swordfern, dandelion, trillium, oxalis, bedstraw, lupine, and thistle.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

Coniferous plants furnish browse, buds, catkins, and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are

Douglas fir, Pacific silver fir, western redcedar, western hemlock, and grand fir.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are salmonberry, Oregon grape, salal, and red elderberry.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are cattails, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are reservoir and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include California quail, pheasant, various songbirds, ground squirrels, rabbits, and coyote.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants, or both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, deer, elk, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, wading birds, shore birds, muskrat, beaver, and various amphibians.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building Site Development, Sanitary Facilities, Construction Materials, and Water Management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps and soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Tables 9a and 9b show the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Tables 10a and 10b show the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Tables 10a and 10b also show the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface *(23)*. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Tables 10a and 10b give ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage because of rapid permeability of he soil or a water table that is high enough to raise the evel of sewage in the lagoon causes a lagoon to unction unsatisfactorily. Pollution results if seepage is xcessive or if floodwater overtops the lagoon. A high ontent of organic matter is detrimental to proper unctioning of the lagoon because it inhibits aerobic ctivity. Slope, bedrock, and cemented pans can cause onstruction problems, and large stones can hinder ompaction of the lagoon floor.

Sanitary landfills are areas where solid waste is sposed of by burying it in soil. There are two types of ndfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in tables 10a and 10b are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Tables 11a and 11b give information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In tables 11a and 11b, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clear sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an *improbable* source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Tables 12a and 12b give information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The

Limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

These tables also give for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In these tables, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution and plasticity.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Tables 13a and 13b give estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 to 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added; for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials *(1)* and the Unified soil classification system *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification; for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection *(6)*.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard

Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the tables.

Physical and Chemical Properties

Tables 14a and 14b show estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion.

Erosion factor T is an estimate of the maximum average rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In tables 14a and 14b, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Tables 15a and 15b give estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sand or gravelly sand. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potenital) when thoroughly wet. These consist chiefly of clay that has high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly mpervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams, by runoff from adjacent slopes, or by inflow from high ides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered to be flooding. Standing water in swamps and marshes or n closed depressional areas is considered to be ponding.

Tables 15a and 15b give the frequency and duration of flooding and the time of year when flooding is most kely to occur.

Frequency, duration, and probable period of flooding are estimated. Frequency is expressed as *none, rare, occasional*, and *frequent*. *None* means that flooding is not probable, *rare* that it is unlikely but is possible under unusual weather conditions (chance of flooding in any year is 0 to 5 percent), *occasional* that it occurs infrequently under normal weather conditions (chance of flooding in any year is 5 to 50 percent), and *frequent* that it occurs often under normal weather conditions (chance of flooding in any year is more than 50 percent).

Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that flooding is most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic flood. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in tables 15a and 15b are the depth to the seasonal high water table; the kind of water table—that is, *perched, artesian*, or *apparent*; and the months of the year that the water table usually is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower water table by a dry zone.

The two numbers in the column "High water table" indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Tables 16a and 16b give estimates of various soil features. The estimates are used in land use planning that involves engineering classification.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(18)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties hat reflect the most important variables within the orders. The last syllable in the name of a suborder ndicates the order. An example is Umbrept *(Umbr*, meaning shade, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, rrangement, and degree of development of pedogenic orizons; soil moisture and temperature regimes; and ase status. Each great group is identified by the name f a suborder and by a prefix that indicates a property f the soil. An example is Haplumbrepts *(Hapl*, meaning minimal horizonation, plus *umbrept*, the suborder of the nceptisols that has an umbric epidedon).

SUBGROUP. Each great group has a typic subgroup. ther subgroups are intergrades or extragrades. The ypic is the central concept of the great group; it is not ecessarily the most extensive. Intergrades are ansitions to other orders, suborders, or great groups. xtragrades have some properties that are not presentative of the great group but do not indicate ansitions to any other known kind of soil. Each ubgroup is identified by one or more adjectives eceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplumbrepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy-skeletal, mixed, mesic Typic Haplumbrepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (12)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (18)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Aschoff Series

The Aschoff series consists of very deep, well drained soils on mountains. These soils formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. Slope is 5 to 65 percent. Elevation is 400 to 2,100 feet. The average annual precipitation is about 85 inches, the average annual air temperature is 50 degrees F, and the average frost-free season is 100 to 200 days.

These soils are medial-skeletal, mesic Andic Haplumbrepts.

Typical pedon of Aschoff very gravelly loam, 30 to 65 percent slopes, about 3 miles northwest of North Bonneville; 200 feet south and 1,200 feet east of the northwest corner of sec. 13, T. 2 N., R. 6 E.

O—2 inches to 0; decomposed needles, leaves, and twigs.

A1—0 to 4 inches; very dark brown (10YR 2/2) very gravelly loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; many very fine roots and common fine and medium roots; many fine irregular pores; 55 percent pebbles; moderately acid; clear wavy boundary.

A2—4 to 12 inches; very dark grayish brown (10YR 3/2) very gravelly loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; many very fine roots and common fine and medium roots; many fine irregular pores; 55 percent pebbles 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

Bw—12 to 33 inches; dark yellowish brown (10YR 3/4) very gravelly loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; many very fine, common fine, and few coarse roots; few fine tubular pores and common fine irregular pores; 40 percent pebbles and 15 percent cobbles; strongly acid; clear smooth boundary.

BC—33 to 47 inches; dark yellowish brown (10YR 4/4) very cobbly loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; many very fine, common fine, and few coarse roots; many fine irregular pores; 20 percent cobbles and 30 percent pebbles; strongly acid; clear smooth boundary.

C—47 to 60 inches; dark yellowish brown (10YR 4/4) very gravelly loam, very pale brown (10YR 7/4) dry; massive; slightly hard, friable, nonsticky and nonplastic; common fine and few medium roots; few fine irregular pores; 45 percent pebbles and 15 percent cobbles; strongly acid.

The umbric epipedon is 10 to 15 inches thick. The solum is 40 to 55 inches thick. Reaction is strongly acid or moderately acid. The content of rock fragments in the control section averages 35 to 55 percent.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry.

The B and BC horizons have hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. They are very gravelly silt loam, very gravelly loam, or very cobbly loam and have 10 to 20 percent cobbles and 15 to 40 percent pebbles.

The C horizon has characteristics similar to those of the B and BC horizons, but it has value of 5 to 7 when dry and the content of rock fragments ranges from 50 to 80 percent, increasing with depth.

Bandid Series

The Bandid series consists of very deep, well drained soils on back slopes, foot slopes, and toe slopes of mountains. These soils formed in stratified, aerially deposited volcanic ash and pumice. Slope is 5 to 90 percent. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 44 degrees F, and the average frost-free season is 90 to 110 days.

These soils are ashy over cindery, frigid Typic Vitrandepts.

Typical pedon of Bandid cindery sandy loam, 5 to 30 percent slopes, about 1 mile west of HooHoo Lake; 1,450 feet south and 200 feet east of the northwest corner of sec. 16, T. 8 N., R. 6 E.

O1—2 inches to 0.5 inch; leaves, needles, and twigs.

O2—0.5 inch to 0; decomposed organic material.

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) cindery sandy loam (volcanic ash and cinders), brown (10YR 5/3) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; 20 percent pumice fragments; moderately acid; abrupt smooth boundary.

A2—3 to 5 inches; brown (7.5YR 5/2) fine sandy loam (volcanic ash), light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many fine irregular pores and common fine and medium tubular pores; 5 percent pumice fragments; slightly acid; abrupt smooth boundary.

A3—5 to 9 inches; black (10YR 2/1) loamy sand (volcanic ash), very dark gray (10YR 3/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine, common medium, and few coarse roots; many fine and medium irregular pores and common fine and medium tubular pores; moderately acid; abrupt smooth boundary.

2Bw1—9 to 15 inches; dark gray (10YR 4/1) gravelly fine sandy loam (volcanic ash and cinders), gray (10YR 5/1) dry; moderate medium platy structure; soft, friable, nonsticky and nonplastic; continuous moderately thick lenses of very dark gray (10YR 3/1) gravelly sand; many very fine and fine roots and common medium roots; many medium tubular pores; 15 percent pumice fragments and 30 percent pebbles; moderately acid; abrupt smooth boundary.

3Bw2—15 to 27 inches; light gray (10YR 7/2) extremely cindery sand (cinders and volcanic ash), white (10YR 8/1) dry; few medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; common very fine roots; many coarse irregular pores; 75 percent pumice fragments and 20 percent pebbles; slightly acid; abrupt wavy boundary.

4Bw3—27 to 30 inches; dark gray (10YR 4/1) gravelly sand (volcanic ash), gray (10YR 6/1) dry; single grain; loose; few very fine and fine roots; many coarse irregular pores; 10 percent pumice fragments and 20 percent pebbles; moderately acid; abrupt wavy boundary.

4Bw4—30 to 33 inches; dark grayish brown (10YR 4/2) sandy loam (volcanic ash), light brownish gray (10YR 6/2) dry; weak medium platy structure; soft, friable, nonsticky and nonplastic; few fine and medium roots; few fine irregular pores and common fine and medium tubular pores; 10 percent pumice fragments; moderately acid; abrupt smooth boundary.

5Bw5—33 to 41 inches; dark brown (7.5YR 3/2) cindery loamy sand (volcanic ash and cinders), brown (7.5YR 5/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots and few medium and coarse roots; many fine, medium, and coarse irregular pores and few fine and medium tubular pores; 25 percent pumice fragments and 15 percent scoria; moderately acid; gradual wavy boundary.

5Bw6—41 to 50 inches; dark gray (10YR 4/1) cindery sandy loam (volcanic ash and cinders), gray (10YR 6/1) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine and few medium roots; few fine irregular pores and common fine and medium tubular pores; 30 percent pumice fragments; slightly acid; gradual wavy boundary.

5Bw7—50 to 60 inches; black (10YR 2/1) loamy sand (volcanic ash), dark gray (10YR 4/1) dry; common medium distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; many fine, medium, and coarse irregular pores; 40 percent soft scoria; slightly acid.

The upper part of the control section is stratified sand, loamy fine sand, and gravelly fine sandy loam. It averages 5 to 20 percent pumice fragments and 10 to 30 percent pebbles. The pumice layer is 10 to 40 inches thick or more and averages 60 to 80 percent cinders and 10 to 20 percent pebbles.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 5 when moist and 3 to 6 when dry, and chroma of 1 to 3. Where value is 3 or less when moist and 5 or less when dry, the horizon is less than 10 inches thick.

The Bw1 horizon is stratified gravelly fine sandy loam, sand, and gravelly sand in the upper part. It has value of 3 or 4 when moist and 5 or 6 when dry. It averages 10 to 30 percent pebbles.

The 3Bw2 horizon has 60 to 80 percent pumice fragments and 5 to 20 percent pebbles. It has stains that have hue of 10YR or 7.5YR, value of 5 or 6 when moist and 6 to 8 when dry, and chroma of 4 to 8 when moist or dry.

The 4Bw and 5Bw horizons are stratified layers of gravelly sand, cindery loamy sand, sandy loam, and loamy sand. They have value of 3 to 5 when moist and 5 to 7 when dry and chroma of 1 to 4 when moist or dry.

Individual layers have 0 to 15 percent pumice fragments, 0 to 15 percent hard pebbles, and 0 to 50 percent soft scoria.

Bannel Series

The Bannel series consists of very deep, well drained soils on back slopes and ridges of mountains. These soils formed in aerially deposited volcanic ash and pumice. Slope is 5 to 90 percent. Elevation is 1,500 to 2,800 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free season is 90 to 110 days.

These soils are ashy, frigid Typic Vitrandepts.

Typical pedon of Bannel cindery sandy loam, 30 to 65 percent slopes, about 4 miles northeast of Marble Mountain; 700 feet north and 2,000 feet west of the southeast corner of sec. 34, T. 8 N., R. 6 E.

O—0.5 inch to 0; leaves, needles, and twigs.

A1—0 to 1 inch; dark grayish brown (10YR 4/2) fine sandy loam (volcanic ash), light gray (10YR 7/1) dry; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine irregular pores; moderately acid; abrupt wavy boundary.

A2—1 inch to 4 inches; very dark grayish brown (10YR 3/2) cindery sandy loam (volcanic ash and cinders), grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many fine irregular pores; 20 percent pumice fragments; slightly acid; abrupt wavy boundary.

2Bw1—4 to 10 inches; light gray (10YR 7/2) extremely cindery sand (cinders and volcanic ash), white (10YR 8/2) dry; yellowish brown (10YR 5/6) iron stains; single grain; loose; many very fine, fine, and medium roots; many medium and coarse irregular pores; 70 percent pumice fragments and 15 percent pebbles; slightly acid; abrupt wavy boundary.

3Bw2—10 to 17 inches; dark brown (7.5YR 4/4) fine sandy loam (volcanic ash), pale brown (10YR 6/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine roots and common fine and medium roots; many fine irregular pores; 10 percent pumice fragments; slightly acid; abrupt wavy boundary.

3Bw3—17 to 22 inches; brown (10YR 5/3) cindery fine sandy loam (volcanic ash and cinders), pale brown (10YR 6/3) dry; many fine distinct dark yellowish brown (10YR 3/6) stains; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots; many fine irregular pores; 25 percent pumice fragments; neutral; abrupt wavy boundary.

3Bw4—22 to 41 inches; brown (10YR 5/3) cindery loamy sand (volcanic ash and cinders), very pale brown (10YR 7/3) dry; many fine distinct brownish yellow (10YR 6/8) stains; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many fine irregular pores and few fine tubular pores; 20 percent pumice fragments and 5 percent pebbles; neutral; clear wavy boundary.

3BC—41 to 50 inches; dark brown (10YR 4/3) cindery loam (volcanic ash and cinders), pale brown (10YR 6/3) dry; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; weakly smeary; common very fine roots; common fine irregular pores; 30 percent pumice fragments; neutral; abrupt wavy boundary.

4C—50 to 60 inches; brownish yellow (10YR 6/8) extremely cindery sand (cinders and volcanic ash), yellow (10YR 7/8) dry; single grain; loose; many coarse irregular pores; 60 percent pumice fragments and 20 percent pebbles; slightly acid.

The control section averages 10 to 30 percent pumice fragments and 0 to 15 percent rock fragments. It averages 60 percent or more vitric volcanic ash and pumice.

The A horizon has value of 3 to 5 when moist and 5 to 8 when dry, and it has chroma of 1 to 3 when moist or dry.

The 2Bw horizon has 60 to 80 percent pumice. It has stains that have hue of 10YR or 7.5YR and value of 4 or 5 when moist. Reaction is moderately acid or slightly acid.

The 3Bw horizon has hue of 10YR or 7.5YR, value of 3 to 5 when moist and 5 or 7 when dry, and chroma of 2 to 4 when moist or dry. It has stains that have value of 3 to 6 when moist and 4 to 8 when dry and chroma of 4 to 8 when moist or dry. The horizon has strata of fine sandy loam, sandy loam, and loamy sand. It averages 10 to 30 percent pumice fragments. It has intermittent lenses of soft scoria and coarse sand-sized ash. Reaction is moderately acid to neutral.

The 3BC horizon has hue of 7.5YR or 10YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 2 or 3 when moist or dry. It is cindery sandy loam or cindery loam. Content of pumice fragments ranges from 15 to 35 percent. Reaction is slightly acid or neutral.

The 4C horizon has value of 5 or 6 when moist, and it has chroma of 6 to 8 when moist or dry. The horizon is 60 to 80 percent pumice fragments and 0 to 20 percent rock fragments. It is extremely cindery sand or extremely cindery loamy sand. Reaction is slightly acid or neutral.

Benham Series

The Benham series consists of very deep, well drained soils on back slopes and foot slopes of mountains. These soils formed in layers of aerially deposited volcanic ash and pumice. Slope is 0 to 65 percent. Elevation is 1,800 to 2,800 feet. The average annual precipitation is about 85 inches, the average annual air temperature is about 44 degrees F, and the average frost-free season is 90 to 110 days.

These soils are cindery over medial, frigid Typic Vitrandepts.

Typical pedon of Benham very cindery sandy loam, 0 to 30 percent slopes, about 3 miles north of Ryan Lake; 1,200 feet south and 1,000 feet east of the northwest corner of sec. 4, T. 10 N., R. 6 E.

01—1.5 inches to 1 inch; leaves, needles, and twigs.

02—1 inch to 0; decomposed organic material.

E—0 to 2 inches; dark grayish brown (10YR 4/2) very cindery sandy loam, light brownish gray (10YR 6/2) dry; single grain; loose; many very fine, fine, and medium roots and few coarse roots; many coarse irregular pores; 55 percent pumice fragments; slightly acid; abrupt wavy boundary.

Bw—2 to 28 inches; light gray (10YR 7/2) extremely cindery sand, white (10YR 8/2) dry; many medium distinct stains that are yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) when dry; single grain; loose; many very fine, fine, and medium roots and common coarse roots; many medium and coarse irregular pores; 75 percent pumice fragments and 15 percent pebbles; slightly acid; abrupt smooth boundary.

Bsb1—28 to 30 inches; very dark grayish brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine, fine, and medium roots and few coarse roots; common very fine irregular pores and few fine tubular pores; slightly acid; abrupt smooth boundary.

Bsb2—30 to 34 inches; grayish brown (10YR 5/2) sandy loam, light brownish gray (10YR 6/2) dry; many fine distinct mottles that are yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) when dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine, common medium, and few coarse roots; common fine irregular and tubular pores; 5 percent pumice fragments; slightly acid; abrupt wavy boundary.

2Bsb3—34 to 38 inches; grayish brown (10YR 5/2) fine sandy loam, light gray (10YR 7/2) dry; common fine distinct mottles that are dark yellowish brown (10YR 4/6) and brownish yellow (10YR 6/6) when dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine roots and common fine and medium roots; common very fine irregular pores and common fine tubular pores; 10 percent pumice fragments; moderately acid; abrupt wavy boundary.

3Bsb4—38 to 43 inches; grayish brown (10YR 5/2) very cindery loamy sand, light brownish gray (10YR 6/2) dry; common fine distinct mottles that are yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) when dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and common fine roots; many fine and common medium irregular pores; 40 percent pumice fragments; moderately acid; clear wavy boundary.

3Bsb5—43 to 60 inches; strong brown (7.5YR 5/6) extremely cindery sand, reddish yellow (7.5YR 6/6) dry; single grain; loose; common very fine roots and few fine and medium roots; many medium and coarse irregular pores; 75 percent pumice fragments and 15 percent pebbles; slightly acid.

The depth to the buried profile ranges from 20 to 35 inches.

The E horizon has hue of 10YR or 2.5Y, value of 4 or 5 when moist and 6 to 8 when dry, and chroma of 0 to 2 when moist or dry. Content of pumice fragments ranges from 35 to 60 percent.

The Bw horizon has hue of 10YR or 7.5YR, value of 6 to 8 when moist and 7 or 8 when dry, and chroma of 1 to 3 when moist or dry. It has fine or medium stains that have hue of 10YR to 5YR, value of 5 to 7 when moist and 6 to 8 when dry, and chroma of 4 to 8 when moist or dry. Content of pumice fragments ranges from 45 to 75 percent.

The 2Bsb horizon has hue of 10YR to 5YR, value of 4 to 6 when moist and 6 to 8 when dry, and chroma of 1 to 3 when moist or dry. It has fine or medium mottles that have hue of 10YR to 5YR, value of 3 to 6 when moist and 5 to 7 when dry, and chroma of 4 to 8 when moist or dry. Content of pumice fragments ranges from 5 to 25 percent.

The 3Bsb horizon has hue of 10YR to 5YR, value of 5 to 7 when moist and 6 to 8 when dry, and chroma of

2 to 8 when moist or dry. It is 40 to 80 percent pumice fragments and 0 to 20 percent hard pebbles.

Bonneville Series

The Bonneville series consists of very deep, somewhat excessively drained soils on river terraces. These soils formed in alluvial sand and gravel derived dominantly from basalt and andesite. Slope is 0 to 5 percent. Elevation is 50 to 400 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is 185 to 230 days.

These soils are sandy-skeletal, mixed, mesic Entic Xerumbrepts.

Typical pedon of Bonneville stony sandy loam, about 0.5 mile west of North Bonneville, 2,140 feet north and 200 feet east of the southwest corner of sec. 20, T. 2 N., R. 7 E.

A1—0 to 6 inches; dark brown (10YR 3/3) stony sandy loam, brown (10YR 5/3) dry; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots and common medium roots; many coarse irregular pores; 20 percent pebbles, 5 percent cobbles, and 5 percent stones; moderately acid; clear wavy boundary.

A2—6 to 12 inches; dark brown (10YR 3/3) extremely gravelly coarse sandy loam, brown (10YR 5/3) dry; single grain; loose; many very fine and fine roots and few medium roots; many coarse irregular pores; 50 percent pebbles, 10 percent cobbles, and 5 percent stones; moderately acid; clear wavy boundary.

C1—12 to 20 inches; dark brown (10YR 4/3) extremely gravelly coarse sand, brown (10YR 5/3) dry; single grain; loose; common fine and medium roots; many coarse irregular pores; 55 percent pebbles, 10 percent cobbles, and 5 percent stones; slightly acid; clear wavy boundary.

C2—20 to 30 inches; dark yellowish brown (10YR 4/4) extremely gravelly coarse sand, yellowish brown (10YR 5/4) dry; single grain; loose; many very fine, fine, and medium roots and few coarse roots; many coarse irregular pores; 50 percent pebbles, 10 percent cobbles, and 5 percent stones; slightly acid; clear wavy boundary.

C3—30 to 60 inches; dark yellowish brown (10YR 4/4) extremely gravelly coarse sand, light yellowish brown (10YR 6/4) dry; single grain; loose; common very fine and few fine roots; common coarse irregular pores; 60 percent pebbles, 5 percent cobbles, and 15 percent stones; slightly acid.

The umbric epipedon is 10 to 14 inches thick. The control section averages 60 to 80 percent rock fragments, including 35 to 60 percent pebbles, 5 to 10 percent cobbles, and 5 to 15 percent stones. From 3 to 5 percent of the surface is covered with stones.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The C horizon has value of 4 or 5 when moist and 5 or 6 when dry. It is extremely gravelly loamy sand, extremely gravelly coarse sand, or extremely cobbly loamy sand. Reaction is moderately acid or slightly acid.

Cattcreek Series

The Cattcreek series consists of deep and very deep, well drained soils on back slopes and in cirque basins on mountains. These soils formed in pumice and volcanic ash overlying colluvium derived from andesite. Slope is 30 to 90 percent. Elevation is 3,000 to 5,300 feet. The average annual precipitation is about 110 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 70 to 90 days.

These soils are cindery over medial-skeletal Typic Cryorthods.

Typical pedon of Cattcreek very cindery loamy sand, 65 to 90 percent slopes, about 0.5 mile northeast of Mount Margaret; 2,000 feet north and 1,000 feet west of the southeast corner of sec. 25, T. 10 N., R. 5 E.

O—1.5 inches to 0; decomposed organic material.

E—0 to 2 inches; dark grayish brown (10YR 4/2) very cindery loamy sand, light brownish gray (10YR 6/2) dry; single grain; loose; many fine roots; many fine irregular pores; 55 percent pumice fragments; moderately acid; abrupt smooth boundary.

Bs1—2 to 6 inches; dark yellowish brown (10YR 3/4) very cindery loamy sand, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure; loose; many very fine, fine, and medium roots and common coarse roots; many fine irregular pores; 50 percent pumice fragments; moderately acid; abrupt smooth boundary.

Bs2—6 to 15 inches; dark brown (7.5YR 4/4) very cindery sand, light brown (7.5YR 6/4) dry; single grain; loose; many fine and medium roots and few coarse roots; many coarse irregular pores; 55

percent pumice fragments; slightly acid; clear wavy boundary.

Bs3—15 to 30 inches; strong brown (7.5YR 5/6) extremely cindery sand, reddish yellow (7.5YR 7/6) dry; single grain; loose; common fine and medium roots and few coarse roots; many coarse irregular pores; 80 percent pumice fragments; slightly acid; abrupt wavy boundary.

2Eb—30 to 32 inches; brown (7.5YR 5/2) gravelly loam, pinkish gray (7.5YR 6/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; few fine and medium roots; few fine and medium irregular pores; 10 percent pumice fragments and 30 percent pebbles; slightly acid; abrupt irregular boundary.

2Bsb—32 to 54 inches; dark yellowish brown (10YR 4/4) extremely gravelly loam, light yellowish brown (10YR 6/4) dry; weak medium and coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; few fine, medium, and coarse roots; common fine pores; 50 percent pebbles and 25 percent cobbles; slightly acid; abrupt irregular boundary.

3R—54 inches; fractured andesite.

Depth to bedrock is 40 to 60 inches. Depth to the buried layers is 30 to 35 inches. The lower part of the control section is 50 to 85 percent rock fragments. Reaction of the profile is moderately acid or slightly acid throughout.

Chemawa Series

The Chemawa series consists of very deep, well drained soils on terraces, foot slopes, and back slopes. These soils formed in pyroclastic flows consisting mostly of volcanic ash. Slope is 2 to 50 percent. Elevation is 800 to 1,200 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 47 degrees F, and the average frost-free season is 110 to 160 days.

These soils are medial, mesic Andic Xerumbrepts.

Typical pedon of Chemawa loam, 30 to 50 percent slopes, about 3 miles northwest of Underwood; 1,100 feet south and 600 feet west of the northeast corner of sec. 19, T. 3 N., R. 10 E., W.M.

O1—1.5 inches to 0.5 inch; litter of needles, leaves, and twigs.

O2—0.5 inch to 0; decomposed organic material.

Ac1—0 to 4 inches; dark brown (7.5YR 3/3) loam, brown (7.5YR 5/3) dry; weak medium granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots and few coarse roots; many fine irregular pores; 30 percent shotlike aggregates 2 to 4 millimeters in size; neutral; clear smooth boundary.

Ac2—4 to 14 inches; dark brown (7.5YR 3/3) loam, brown (7.5YR 5/3) dry; weak coarse granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots, common medium roots, and few coarse roots; many very fine and common fine irregular pores; 25 percent shotlike aggregates 2 to 4 millimeters in size; neutral; clear wavy boundary.

Bw1—14 to 31 inches; dark brown (7.5YR 4/4) loam, reddish yellow (7.5YR 6/6) dry; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; weakly smeary; common very fine and fine roots and few medium roots; common fine irregular pores; 10 percent shotlike aggregates 2 to 4 millimeters in size; neutral; gradual smooth boundary.

Bw2—31 to 60 inches; strong brown (7.5YR 5/6) loam, reddish yellow (7.5YR 6/6) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; weakly smeary; common fine roots; common fine irregular pores; 5 percent shotlike aggregates 2 to 4 millimeters in size; neutral.

Content of shotlike aggregates ranges from 10 to 30 percent in the Ac horizon and decreases with increasing depth. The volcanic ash influence extends to a depth of 60 inches or more. The umbric epipedon is 10 to 14 inches thick. Content of rock fragments in the control section ranges from 0 to 5 percent.

The Ac horizon has hue of 5YR to 10YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist and 3 or 4 when dry. Reaction is slightly acid to neutral.

The Bw horizon has hue of 5YR to 10YR, value of 3 to 5 when moist and 5 to 7 when dry, and chroma of 4 to 6 when moist or dry. Reaction is moderately acid to neutral. The horizon is loam or silt loam.

Cinnamon Series

The Cinnamon series consists of very deep, well drained soils on terraces, foot slopes, and back slopes of mountains. These soils formed in pyroclastic flows of volcanic ash. Slope is 2 to 90 percent. Elevation is 1,600 to 2,800 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 44 degrees F, and the average frost-free season is 90 to 110 days.

These soils are ashy over medial, frigid Typic Vitrandepts.

Typical pedon of Cinnamon sandy loam, 30 to 65 percent slopes, on Forest Service Road N816, about 5.5 miles northeast of Cougar; 2,000 feet south and 2,600 feet east of the northwest corner of sec. 8, T. 7 N., R. 5 E.

O1—4 to 3 inches; needles, leaves, and twigs.

O2—3 inches to 0; decomposed organic matter.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) sandy loam (volcanic ash), dark brown (10YR 4/3) dry; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium roots; many fine irregular pores; slightly acid; clear wavy boundary.

Bw1—3 to 11 inches; dark yellowish brown (10YR 3/4) loamy sand (volcanic ash), yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many fine irregular pores and common fine tubular pores; neutral; gradual wavy boundary.

Bw2—11 to 22 inches; dark brown (10YR 4/3) loamy sand (volcanic ash), light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots and few coarse roots; many fine irregular pores and common fine tubular pores; slightly acid; abrupt wavy boundary.

2Bwb1—22 to 35 inches; dark yellowish brown (10YR 4/4) sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; weakly smeary; many fine and medium roots; many fine irregular pores and few fine tubular pores; 20 percent soft weathered pumice fragments and 5 percent hard pebbles; moderately acid; clear wavy boundary.

2Bwb2—35 to 60 inches; dark yellowish brown (10YR 4/4) sandy loam, very pale brown (10YR 7/4) dry; moderate medium and coarse subangular blocky structure; very hard, firm, slightly sticky and nonplastic; weakly smeary; common fine roots; many fine irregular pores and few fine tubular pores; 30 percent soft weathered pumice fragments and 10 percent hard pebbles; slightly acid.

The ashy mantle is 20 to 30 inches thick and has more than 60 percent volcanic ash and cinders.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 when moist and 4 to 6 when dry, and chroma of 2 or 3 when moist or dry. Reaction is slightly acid or neutral.

The Bw horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 3 or 4 when moist or dry. Texture is loamy sand or sandy loam. Reaction is slightly acid or neutral.

The 2Bwb horizon has value of 4 or 5 when moist and 5 to 7 when dry, and it has chroma of 4 to 6 when moist or dry. The horizon is sandy loam or loam and has 5 to 15 percent andesitic pebbles and 20 to 50 percent soft weathered pumice fragments. Reaction is moderately acid or slightly acid. Below a depth of 40 inches in some pedons, the 2Bwb horizon is compacted or weakly cemented and is very hard or hard when dry.

Colter Series

The Colter series consists of very deep, well drained soils on back slopes and foot slopes of mountains. These soils formed in layers of aerially deposited volcanic ash and pumice. Slope is 0 to 90 percent. Elevation is 2,800 to 5,400 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 75 to 95 days.

These soils are cindery over medial Entic Cryandepts.

Typical pedon of Colter cindery sandy loam, 30 to 65 percent slopes, about 1 mile west of Ryan Lake; 1,300 feet south and 1,700 feet east of the northwest corner of sec. 17, T. 10 N., R. 6 E.

O1—2 inches to 1 inch; leaves, twigs, and needles.

O2—1 inch to 0; decomposed organic material.

E—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam, gray (10YR 6/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine irregular pores; moderately acid; abrupt smooth boundary.

Bw—2 to 6 inches; very dark grayish brown (10YR 3/2) cindery sandy loam, grayish brown (10YR 5/2) dry; few fine prominent dark brown (7.5YR 4/4) mottles; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and common fine roots; many fine irregular pores; 20 percent pumice fragments; moderately acid; abrupt smooth boundary.

C—6 to 33 inches; white (10YR 8/1) extremely cindery sand, white (10YR 8/1) dry; dark yellowish brown

(10YR 4/4) iron stains; single grain; loose; many very fine and fine roots and common medium roots; many coarse irregular pores; 65 percent pumice fragments and 15 percent pebbles; slightly acid; abrupt wavy boundary.

2Bwb1—33 to 37 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots; many fine irregular pores and common fine tubular pores; slightly acid; abrupt wavy boundary.

2Bwb2—37 to 48 inches; yellowish brown (10YR 5/4) sandy loam, light yellowish brown (10YR 6/4) dry; common fine distinct mottles that are gray (10YR 6/1) and light gray (10YR 7/1) when dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots and few medium roots; common very fine and fine irregular pores and few fine tubular pores; 5 percent pumice fragments; slightly acid; gradual wavy boundary.

2Bwb3—48 to 54 inches; gray (10YR 5/1) cindery loamy sand, light gray (10YR 7/1) dry; common medium distinct mottles that are brown (10YR 5/3) and pale brown (10YR 6/3) when dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; many fine irregular pores; 30 percent pumice fragments; slightly acid; abrupt wavy boundary.

Bwb4—54 to 60 inches; strong brown (7.5YR 5/6) extremely cindery sand, reddish yellow (7.5YR 6/6) dry; single grain; loose; few fine roots; many coarse irregular pores; 60 percent pumice fragments and 15 percent pebbles; slightly acid.

The A horizon has hue of 10YR or 2.5Y, value of 4 r 5 when moist and 6 to 8 when dry, and chroma of 0 2 when moist or dry.

The Bw horizon has hue of 10YR or 7.5YR, value of to 5 when moist and 5 to 7 when dry, and chroma of or 3 when moist or dry.

The C horizon has hue of 10YR or 7.5YR, value of 7 r 8 when moist or dry, and chroma of 1 to 6 when oist or dry. Content of pebble-sized pumice fragments nges from 45 to 65 percent and content of hard ebbles ranges from 5 to 20 percent.

The 2Bwb horizon has hue of 10YR to 5YR, value of to 5 when moist and 5 to 8 when dry, and chroma of to 4 when moist or dry. It has fine or medium mottles at have hue of 10YR to 5YR, value of 3 to 6 when oist and 6 or 7 when dry, and chroma of 1 to 8 when moist or dry. Content of pebble-sized pumice fragments ranges from 0 to 30 percent.

The 3Bwb horizon has hue of 7.5YR or 5YR, value of 5 to 7 when moist and 6 to 8 when dry, and chroma of 6 to 8 when moist or dry. Content of pumice fragments ranges from 60 to 80 percent, and content of pebbles ranges from 10 to 15 percent.

Dougan Series

The Dougan series consists of moderately deep, well drained soils on back slopes and ridges of mountains. These soils formed in colluvium derived from andesite and granodiorite mixed with volcanic ash. Slope is 5 to 65 percent. Elevation is 2,000 to 3,000 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 43 degrees F, and the frost-free season is 90 to 130 days.

These soils are medial-skeletal, frigid Andic Haplumbrepts.

Typical pedon of Dougan very gravelly loam, 30 to 65 percent slopes, about 5 miles southeast of Silver Star Mountain; 600 feet south and 900 feet west of the northeast corner of sec. 27, T. 3 N., R. 5 E.

O—1 inch to 0; leaves, twigs, and needles.

A—0 to 11 inches; very dark grayish brown (10YR 3/2) very gravelly loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; weakly smeary; common very fine, fine, and medium roots; many fine irregular pores; 40 percent pebbles and 10 percent cobbles; strongly acid; clear wavy boundary.

Bw—11 to 24 inches; light olive brown (2.5Y 5/3) very gravelly loam, light yellowish brown (2.5Y 6/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine irregular and tubular pores; 30 percent pebbles, 10 percent cobbles, and 10 percent saprolitic fragments; strongly acid; clear smooth boundary.

C—24 to 39 inches; light yellowish brown (2.5Y 6/3) extremely gravelly loam, pale yellow (2.5Y 7/3) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine irregular pores; 55 percent pebbles, 15 percent cobbles, and 15 percent saprolitic fragments; very strongly acid; clear wavy boundary.

R—39 inches; fractured andesite.

Depth to bedrock is 30 to 40 inches. The control section averages 45 to 70 percent pebbles and cobbles and 10 to 20 percent saprolitic fragments. The umbric epipedon is 10 to 12 inches thick and is influenced by volcanic ash.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 1 or 2 when moist and 1 to 3 when dry. The horizon has 30 to 40 percent pebbles and 5 to 10 percent cobbles. Reaction is strongly acid or moderately acid.

The B horizon has hue of 10YR or 2.5Y, value of 4 or 5 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It has 30 to 40 percent pebbles, 5 to 20 percent cobbles, and 5 to 30 percent saprolitic fragments. It is very gravelly loam, very gravelly silt loam, very cobbly loam, or very cobbly silt loam. Reaction is very strongly acid or strongly acid.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6 when moist and 6 or 7 when dry, and chroma of 3 to 5 when moist or dry. It has 45 to 55 percent pebbles, 15 to 30 percent cobbles, and 5 to 15 percent saprolitic fragments. It is extremely gravelly loam or extremely cobbly loam. Reaction is very strongly acid or strongly acid.

Elkprairie Series

The Elkprairie series consists of very deep, well drained soils on broad mountaintops and hillsides. These soils formed in volcanic ash and pumice over weathered volcanic ash and pumice. Slope is 5 to 30 percent. Elevation is 2,600 to 4,700 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 40 degrees F, and the average frost-free season is 75 to 95 days.

These soils are ashy over medial Typic Cryorthents.

Typical pedon of Elkprairie loamy sand, 5 to 30 percent slopes, about 1 mile southeast of Coldwater Lake, 700 feet east and 300 feet north of the southwest corner of sec. 32, T. 10 N., R. 5 E.

C1—0 to 6 inches; dark gray (5Y 4/1) loamy sand, light gray (5Y 6/1) dry; massive; soft, friable, nonsticky and nonplastic; very strongly acid; abrupt smooth boundary.

C2—6 to 11 inches; dark gray (5Y 4/1) cindery sand, light gray (5Y 6/1) dry; single grain; loose; 20 percent pumice fragments; very strongly acid; gradual wavy boundary.

C3—11 to 17 inches; dark gray (5Y 4/1) cindery coarse sand, olive gray (5Y 5/2) dry; single grain; 20 percent pumice fragments; very strongly acid; gradual wavy boundary.

C4—17 to 23 inches; very dark gray (10YR 3/1) very cindery loamy sand, gray (10YR 5/1) dry; single grain; loose; 30 percent fine pumice fragments and 10 percent pebbles; very strongly acid; abrupt smooth boundary.

2Ab—23 to 26 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine tubular pores; extremely acid; gradual wavy boundary.

2Bwb1—26 to 29 inches; brown (10YR 4/3) cindery loam, yellowish brown (10YR 5/6) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; common very fine and fine tubular pores; 20 percent pumice fragments; very strongly acid; gradual wavy boundary.

2Bwb2—29 to 36 inches; reddish yellow (7.5YR 6/8) cindery loam, yellow (10YR 7/8) dry; common medium distinct yellowish brown (10YR 5/4) mottles, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; 20 percent pumice fragments; very strongly acid; gradual wavy boundary.

2Bwb3—36 to 60 inches; yellowish brown (10YR 5/8) loam, yellow (10YR 8/8) dry; common medium distinct gray (5Y 5/1) mottles, light gray (5Y 7/1) dry; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; weakly smeary; 10 percent pumice fragments; moderately acid.

Depth to the buried soil ranges from 20 to 35 inches. It is very strongly acid to moderately acid. Depth to medial material ranges from 36 to 50 inches.

The C horizon has hue of 2.5Y or 5Y, value of 3 or 4 when moist and 5 to 7 when dry, and chroma of 1 or 2 when moist or dry. It is loamy sand to sand and is 10 to 30 percent pumice fragments.

The 2Ab horizon has value of 2 or 3 when moist and 3 or 4 when dry, and it has chroma of 1 or 2 when moist or dry. It is fine sandy loam or sandy loam.

The 2Bwb horizon has hue of 7.5YR or 10YR, value of 4 to 6 when moist and 5 to 8 when dry, and chroma of 3 to 8 when moist or dry. Mottles are none to common and have hue of 10YR to 5Y, value of 5 to 7 when moist or dry, and chroma of 1 to 6 when moist or dry. Content of pumice fragments ranges from 10 to 25 percent.

Forsyth Series

The Forsyth series consists of very deep, somewhat excessively drained soils on upland terraces and terrace escarpments. These soils formed in pyroclastic flow and lahar material with a thin mantle of aerially deposited volcanic ash and pumice. Slope is 0 to 120 percent. Elevation is 1,600 to 2,800 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is 90 to 110 days.

These soils are sandy-skeletal, mixed, frigid Andeptic Udorthents.

Typical pedon of Forsyth cobbly loamy sand, 0 to 30 percent slopes, about 2 miles northeast of Marble Mountain; 600 feet north and 1,800 feet east of the southwest corner of sec. 34, T. 8 N., R. 5 E.

O—0.5 inch to 0; decomposed organic material.
E—0 to 3 inches; very dark grayish brown (10YR 3/2) cobbly loamy sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; many fine irregular pores; 10 percent pumice fragments, 5 percent pebbles, and 15 percent cobbles; moderately acid; clear wavy boundary.
Bw—3 to 8 inches; dark yellowish brown (10YR 3/4) gravelly sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; soft, friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots and common medium roots; many fine irregular pores; 15 percent pumice fragments, 20 percent pebbles, and 5 percent cobbles; slightly acid; abrupt wavy boundary.
C1—8 to 19 inches; dark brown (10YR 4/3) extremely cobbly sand, very pale brown (10YR 7/3) dry; massive; loose; many very fine and few fine roots; many fine and medium irregular pores; 40 percent pebbles and 25 percent cobbles; slightly acid; abrupt wavy boundary.
C2—19 to 60 inches; dark gray (10YR 4/1) extremely stony sand, light gray (10YR 7/1) dry; massive; loose; many medium and coarse pores; 40 percent pebbles, 15 percent cobbles, and 20 percent stones; slightly acid.

The control section has 50 to 85 percent rock agments. Reaction is moderately acid to neutral roughout.

The E horizon has value of 5 to 7 when dry and chroma of 1 or 2 when moist or dry. It has 5 to 10 percent pebbles, 15 to 25 percent cobbles, and 0 to 10 percent stones.

The Bw horizon has value of 5 or 6 when dry and chroma of 2 to 4 when moist or dry. It has 20 to 40 percent pebbles, 5 to 30 percent cobbles, and 0 to 15 percent pumice fragments.

The 2C horizon has value of 3 or 4 when moist and 6 or 7 when dry, and it has chroma of 1 to 3 when moist or dry.

Fortran Series

The Fortran series consists of very deep, somewhat excessively drained soils on terrace escarpments. These soils formed in pyroclastic flow and lahar material with a thin mantle of volcanic ash and pumice. Slope is 65 to 120 percent. Elevation is 800 to 1,800 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 52 degrees F, and the average frost-free season is 115 to 135 days.

These soils are sandy-skeletal, mixed, mesic Typic Vitrandepts.

Typical pedon of Fortran cindery loamy sand, 65 to 120 percent slopes, about 0.5 mile east of Swift Creek Dam; 2,000 feet north and 400 feet east of the southwest corner of sec. 21, T. 7 N., R. 5 E.

O1—3 inches to 1 inch; leaves, needles, and twigs.
O2—1 inch to 0; decomposed organic material.
A—0 to 3 inches; dark brown (10YR 3/3) cindery loamy sand, brown (10YR 5/3) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine irregular pores; 15 percent pumice fragments and 5 percent pebbles; moderately acid; clear wavy boundary.
Bw—3 to 11 inches; dark yellowish brown (10YR 4/4) cindery sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium and coarse roots; many fine irregular pores; 15 percent pumice fragments and 5 percent pebbles; moderately acid; clear wavy boundary.
BC—11 to 17 inches; dark brown (10YR 4/3) very gravelly sandy loam, brown (10YR 5/3) dry; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine irregular

pores; 35 percent pebbles, 5 percent cobbles, and 5 percent pumice fragments; slightly acid; abrupt wavy boundary.

2C—17 to 60 inches; gray (5Y 5/1) extremely gravelly loamy sand, light gray (5Y 7/1) dry; massive; hard, firm, nonsticky and nonplastic; few fine roots; few fine tubular pores; 55 percent pebbles, 10 percent cobbles, and 5 percent stones; slightly acid.

Depth to the 2C horizon ranges from 15 to 25 inches.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry. It has 15 to 25 percent pumice fragments and 0 to 5 percent pebbles.

The BC horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 3 or 4 when moist or dry.

The 2C horizon has hue of 10YR to 5Y. It has 40 to 60 percent pebbles, 5 to 15 percent cobbles, and 0 to 10 percent stones.

Hatchet Series

The Hatchet series consists of moderately deep and deep, well drained soils on back slopes and shoulder slopes of mountains. These soils formed in residuum and colluvium derived dominantly from basalt and andesite mixed with volcanic ash. Slope is 30 to 90 percent. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 75 to 95 days.

These soils are medial-skeletal Typic Cryorthods.

Typical pedon of Hatchet gravelly sandy loam, 65 to 90 percent slopes, about 0.5 mile south of Hanaford Lake; 2,500 feet south and 1,900 feet east of the northwest corner of sec. 30, T. 10 N., R. 5 E.

O—0.5 inch to 0; decomposed organic material.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam, dark grayish brown (10YR 4/2) dry; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and common medium and coarse roots; many very fine irregular pores; 20 percent pebbles; moderately acid; abrupt smooth boundary.

Bs1—3 to 6 inches; dark brown (7.5YR 3/4) gravelly sandy loam, brown (7.5YR 5/4) dry; weak fine granular structure and weak fine subangular blocky; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine roots, common fine roots, and few medium roots; many fine irregular pores; 15 percent pebbles and 5 percent cobbles; moderately acid; clear wavy boundary.

Bs2—6 to 10 inches; dark brown (7.5YR 3/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine roots and few medium roots; many fine irregular pores; 10 percent pebbles and 5 percent cobbles; moderately acid; abrupt wavy boundary.

Bs3—10 to 20 inches; dark yellowish brown (10YR 3/4) extremely cobbly loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; weakly smeary; many very fine and fine roots and common medium roots; many fine and medium irregular pores and few fine tubular pores; 30 percent pebbles and 40 percent cobbles; moderately acid; abrupt wavy boundary.

C—20 to 28 inches; yellowish brown (10YR 5/4) extremely cobbly clay loam, light yellowish brown (10YR 6/4) dry; massive; slightly hard, friable, slightly sticky and plastic; common fine and medium roots; many coarse irregular pores; 30 percent pebbles and 45 percent cobbles; slightly acid; clear wavy boundary.

R—28 inches; fractured andesite.

Depth to the lithic contact is 20 to 40 inches. The control section averages 60 to 90 percent pebbles and cobbles.

The A horizon has hue of 10YR or 2.5YR, value of 3 to 4 when moist and 4 to 6 when dry, and chroma of 2 or 3 when moist or dry.

The Bs1 and Bs2 horizons have hue of 7.5YR or 5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 4 to 6 when moist or dry. They have 10 to 20 percent pebbles and 5 to 15 percent cobbles.

The Bs3 horizon has hue of 10YR to 5YR, value of 4 or 5 when moist and 6 or 7 when dry, and chroma of 4 to 6 when moist or dry. It has 20 to 30 percent pebbles and 40 to 50 percent cobbles.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 6 or 7 when dry, and chroma of 3 or 4 when moist or dry. It has 30 to 45 percent pebbles and 40 to 45 percent cobbles. It is extremely cobbly sandy loam, extremely cobbly loam, or extremely cobbly clay loam.

Hesson Series

The Hesson series consists of very deep, well drained soils on terraces and terrace escarpments.

These soils formed in mixed alluvium derived dominantly from quartzite and basic igneous rock. Slope is 5 to 40 percent. Elevation is 400 to 1,000 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 50 degrees F, and the average frost-free season is 160 to 220 days.

These soils are clayey, kaolinitic, mesic Xeric Palehumults.

Typical pedon of Hesson clay loam, 5 to 15 percent slopes, about 3 miles east of Washougal; 100 feet south and 300 feet west of the northeast corner of sec. 7, T. 1 N., R. 5 E.

A—0 to 8 inches; dark brown (7.5YR 3/2) clay loam, dark brown (7.5YR 4/2) dry; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine, fine, and medium irregular pores; moderately acid; abrupt smooth boundary.

AB—8 to 19 inches; dark brown (7.5YR 3/3) clay loam, brown (7.5YR 5/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few medium irregular pores and common very fine and fine irregular pores; moderately acid; clear wavy boundary.

Bt1—19 to 27 inches; dark reddish brown (5YR 3/4) clay loam, yellowish red (5YR 5/6) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few very fine roots; common very fine irregular pores and few fine tubular pores; few thin clay films on faces of peds and in some pores; strongly acid; clear wavy boundary.

Bt2—27 to 47 inches; dark reddish brown (5YR 3/4) clay loam, yellowish red (5YR 5/6) dry; strong medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few fine irregular pores and common very fine and fine tubular pores; common moderately thick clay films on faces of peds and in pores; strongly acid; clear smooth boundary.

Bt3—47 to 60 inches; dark reddish brown (5YR 3/4) clay, yellowish red (5YR 5/6) dry; strong medium subangular blocky structure; hard, firm, very sticky and plastic; few very fine roots; few fine tubular pores; many moderately thick clay films on faces of peds and in pores; strongly acid.

The upper 20 inches of the Bt horizon is 35 to 50 percent clay.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist. Reaction is strongly acid or moderately acid.

The Bt horizon has hue of 5YR or 7.5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 4 to 6 when moist or dry. It is silty clay loam, clay loam, or clay.

Hoffstadt Series

The Hoffstadt series consists of deep, well drained soils on back slopes and foot slopes of mountains. These soils formed in colluvium derived from basic igneous rock mixed with volcanic ash. Slope is 2 to 65 percent. Elevation is 1,800 to 2,600 feet. The average annual precipitation is about 80 inches, and average annual air temperature is about 43 degrees F, and the average frost-free season is 150 to 180 days.

These soils are medial-skeletal, frigid Andic Dystrochrepts.

Typical pedon of Hoffstadt very gravelly sandy loam, 30 to 65 percent slopes, about 2 miles north of Tradedollar Lake; 1,000 feet south and 2,980 feet west of the northeast corner of sec. 6, T. 10 N., R. 5 E.

O—2 inches to 0; partially decomposed organic litter.

A—0 to 4 inches; dark brown (7.5YR 3/2) very gravelly sandy loam, brown (7.5YR 5/2) dry; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; weakly smeary; many very fine roots and common fine and medium roots; many fine irregular pores; 30 percent pebbles, 10 percent cobbles, and 5 percent pumice fragments; moderately acid; clear wavy boundary.

Bw1—4 to 22 inches; dark brown (7.5YR 4/4) very cobbly sandy loam, light brown (7.5YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; weakly smeary; common fine, medium, and coarse roots; many fine irregular pores and common fine and medium tubular pores; 20 percent pebbles, 15 percent cobbles, and 5 percent pumice fragments; moderately acid; clear wavy boundary.

Bw2—22 to 36 inches; dark brown (7.5YR 4/4) very cobbly sandy loam, light brown (7.5YR 6/4) dry; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; weakly smeary; few fine and medium roots; common fine irregular pores and few fine tubular pores; 20 percent pebbles, 25 percent cobbles, and 5 percent pumice fragments; slightly acid; clear wavy boundary.

2C—36 to 55 inches; dark brown (7.5YR 4/4) extremely stony sandy loam, pink (7.5YR 7/4) dry; massive; soft, very friable, slightly sticky and slightly plastic; weakly smeary; few fine roots; common fine irregular pores; 10 percent pebbles, 15 percent cobbles, 40 percent stones, and 5 percent pumice fragments; moderately acid; abrupt irregular boundary.

R—55 inches; fractured basalt.

Depth to bedrock ranges from 40 to 60 inches. The control section averages 40 to 70 percent hard rock fragments. Reaction is moderately acid or slightly acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It has 25 to 35 percent hard pebbles and 10 to 15 percent cobbles.

The Bw horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 4 to 6 when moist or dry. It is very gravelly sandy loam or very cobbly sandy loam. The horizon has 20 to 30 percent hard pebbles and 10 to 25 percent cobbles.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5 when moist and 6 or 7 when dry, and chroma of 4 to 6 when moist or dry. It has 10 to 20 percent hard pebbles, 15 to 25 percent cobbles, and 40 to 50 percent stones.

Hood Series

The Hood series consists of very deep, well drained soils on dissected terraces. These soils formed in lacustrine deposits. Slope is 15 to 30 percent. Elevation ranges from 320 to 560 feet. The average annual precipitation is about 43 inches, the average annual air temperature is about 49 degrees F, and the average frost-free season is 150 to 180 days.

These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Hood loam, 15 to 30 percent slopes, about 3 miles north of Underwood; 1,360 feet south and 200 feet west of the northeast corner of sec. 3, T. 3 N., R. 10 E.

O—1 inch to 0; needles, leaves, and twigs.

A—0 to 8 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak fine and medium granular structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and fine roots and common medium and coarse roots; many very fine and fine irregular pores and common fine tubular pores; slightly acid; clear wavy boundary.

AB1—8 to 13 inches; dark brown (10YR 4/3) loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots and few coarse roots; common very fine and fine irregular pores and few fine tubular pores; slightly acid; clear wavy boundary.

AB2—13 to 27 inches; dark yellowish brown (10YR 4/4) loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots and few coarse roots; common fine and medium irregular and tubular pores; moderately acid; gradual wavy boundary.

Bt—27 to 46 inches; dark brown (10YR 4/3) loam, brownish yellow (10YR 6/6) dry; weak fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine, medium, and coarse roots; few fine and medium irregular pores and common fine tubular pores; few thin clay films on faces of peds and in pores; moderately acid; gradual wavy boundary.

BC—46 to 60 inches; dark brown (10YR 4/3) loam, brownish yellow (10YR 6/6) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine and fine irregular pores and few fine tubular pores; moderately acid.

The A horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 2 or 3 when moist or dry.

The AB horizon has value of 5 or 6 when dry, and it has chroma of 3 to 6 when moist or dry. It is loam or silt loam.

The Bt horizon has value of 5 or 6 when dry, and it has chroma of 3 to 6 when moist or dry. Reaction is moderately acid or slightly acid. The horizon is loam or silt loam and is 18 to 25 percent clay.

Kinney Series

The Kinney series consists of very deep, well drained soils on foot slopes and back slopes of mountains. These soils formed in residuum and colluvium derived dominantly from granodiorite and volcanic ash. Slope is 5 to 65 percent. Elevation is 600 to 2,300 feet. The average annual precipitation is about 90 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is 125 to 145 days.

These soils are medial, mesic Andic Haplumbrepts.

Typical pedon of Kinney loam, 30 to 65 percent slopes, about 6 miles southeast of Silver Star Mountain; 200 feet south and 500 feet west of the northeast corner of sec. 4, T. 2 N., R. 5 E.

O1—3 inches to 1 inch; leaves, twigs, and needles.

O2—1 inch to 0; black (10YR 2/1) decomposed organic matter.

A—0 to 6 inches; dark brown (7.5YR 3/3) loam, brown (7.5YR 5/3) dry; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; many fine and common medium roots; many fine irregular pores; 25 percent dark red (2.5YR 3/6) pebbles that are dominantly cinders and are 5 to 30 millimeters in diameter and 5 percent saprolitic fragments; strongly acid; clear wavy boundary.

AB—6 to 12 inches; dark brown (7.5YR 3/3) loam, brown (7.5YR 5/3) dry; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; many fine and few medium roots; many fine irregular pores; 15 percent pebbles, of which 10 percent is cinders, and 3 percent saprolitic fragments; strongly acid; clear smooth boundary.

Bw1—12 to 22 inches; strong brown (7.5YR 5/6) gravelly clay loam, reddish yellow (7.5YR 6/6) dry; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; weakly smeary; common fine roots; common fine irregular pores; 10 percent pebbles, 5 percent cobbles, and 10 percent saprolitic fragments; very strongly acid; clear wavy boundary.

Bw2—22 to 28 inches; strong brown (7.5YR 5/6) clay loam, reddish yellow (7.5YR 6/6) dry; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; weakly smeary; few fine roots; common fine irregular pores and few fine tubular pores; 5 percent pebbles, 5 percent cobbles, and 40 percent saprolitic fragments; very strongly acid; abrupt smooth boundary.

C—28 to 60 inches; yellowish brown (10YR 5/4) loam, very pale brown (10YR 7/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common medium irregular pores; 10 percent pebbles and 75 percent saprolitic fragments; very strongly acid.

The solum is 20 to 47 inches thick. The umbric epipedon is 10 to 17 inches thick. The A horizon has 15 to 35 percent cinders. The Bw and C horizons average 10 to 25 percent hard rock fragments and 20 to 45 percent saprolitic fragments.

The A and AB horizons have hue of 7.5YR or 10YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 4 to 6 when moist or dry. It is loam, clay loam, or gravelly clay loam. It has 5 to 10 percent pebbles, 0 to 10 percent cobbles, 0 to 15 percent stones, and 0 to 40 percent saprolitic fragments. Reaction is very strongly acid to strongly acid.

The C horizon has 40 to 85 percent saprolitic fragments and 10 to 20 percent hard pebbles.

The Kinney soils in this survey area have fewer rock fragments in the lower part of the control section than is typical for the series. This difference, however, does not significantly affect use and management.

Lonestar Series

The Lonestar series consists of very deep, well drained soils on back slopes, foot slopes, and ridgetops of mountains. These soils formed in volcanic ash and pumice overlying colluvium derived from basic igneous rock. Slope is 5 to 90 percent. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 40 degrees F, and the average frost-free season is 75 to 95 days.

These soils are ashy over medial Humic Cryorthods.

Typical pedon of Lonestar cindery sandy loam, 5 to 30 percent slopes, on Forest Service Road N816, about 5 miles northeast of Cougar; 2,000 feet north and 1,500 feet west of the southeast corner of sec. 6, T. 7 N., R. 5 E.

O1—3 to 2 inches; needles, twigs, and leaves.

O2—2 inches to 0; decomposed organic material.

A—0 to 2 inches; black (10YR 2/1) fine sandy loam (volcanic ash), dark gray (10YR 4/1) dry; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; weakly smeary; many very fine, fine, and medium roots and few coarse roots; many fine irregular pores; moderately acid; abrupt wavy boundary.

Bhs—2 to 14 inches; dark brown (7.5YR 3/4) cindery sandy loam (volcanic ash and cinders), light yellowish brown (10YR 6/4) dry; many large distinct mottles that are dark reddish brown (5YR 3/4) and dark brown (7.5YR 4/4) when dry; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and fine roots and common medium and coarse roots;

common fine irregular pores; 10 percent pebbles and 30 percent pumice fragments; slightly acid; abrupt wavy boundary.

BC—14 to 18 inches; grayish brown (10YR 5/2) loamy sand (volcanic ash), very pale brown (10YR 7/3) dry; single grain; loose; many very fine, fine, and medium roots; many fine irregular pores; 10 percent pumice fragments; neutral; abrupt smooth boundary.

C—18 to 28 inches; yellowish brown (10YR 5/4) cindery loamy sand (volcanic ash and cinders), light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; many fine irregular pores; 20 percent pebbles and 30 percent pumice fragments; neutral; abrupt smooth boundary.

2Bwb—28 to 51 inches; dark yellowish brown (10YR 4/4) gravelly loam, very pale brown (10YR 7/3) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; weakly smeary; few fine and medium roots; common fine irregular pores; 15 percent pebbles, 5 percent cobbles, and 15 percent soft weathered pumice fragments; moderately acid; clear wavy boundary.

3Cb—51 to 60 inches; reddish yellow (7.5YR 6/6) silt loam, yellow (10YR 7/6) dry; weak fine and medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few fine roots; few fine irregular pores; strongly acid.

The Bhs, BC, and C horizons average 15 to 30 percent pumice fragments, and the 2Bwb horizon averages 15 to 25 percent hard rock fragments. Depth to the buried layers ranges from 25 to 35 inches. Content of organic carbon ranges from 6 to 8 percent in the Bhs horizon.

The Bhs horizon has hue of 7.5YR or 10YR, value of 2 or 3 when moist and 5 or 6 when dry, and chroma of 2 to 4 when moist or dry. It has common to many mottles that have hue of 7.5YR or 5YR and chroma of 2 to 4 when moist. Content of pumice fragments ranges from 10 to 35 percent. Reaction is moderately acid or slightly acid.

The C horizon has value of 4 or 5 when moist and chroma of 3 or 4 when moist or dry. It is 10 to 20 percent pebbles and 10 to 35 percent pumice fragments. It is cindery loamy sand, cindery sand, loamy sand, or sand. Reaction is slightly acid or neutral.

The 2Bwb horizon has chroma of 3 or 4 when moist or dry. It has 15 to 25 percent rock fragments, including 10 to 20 percent pebbles and 0 to 5 percent cobbles. It is gravelly loam or gravelly sandy loam. Reaction is moderately acid or slightly acid.

The 3Cb horizon has hue of 7.5YR or 10YR and value of 4 to 6 when moist. It is silt loam or loam and has 0 to 10 percent rock fragments.

McBee Series

The McBee series consists of very deep, moderately well drained soils on flood plains and low river terraces. These soils formed in mixed alluvium derived dominantly from basic igneous rock. Slope is 0 to 3 percent. Elevation is 50 to 200 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 50 degrees F, and the average frost-free season is 160 to 180 days.

These soils are fine-silty, mixed, mesic Cumulic Ultic Haploxerolls.

Typical pedon of McBee silt loam, about 2 miles east of Prindle; 2,000 feet south and 1,000 feet west of the northeast corner of sec. 6, T. 1 N., R. 6 E.

Oi—1 inch to 0; leaves and twigs.

A1—0 to 3 inches; very dark brown (10YR 2/2) silt loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure and moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; moderately acid; abrupt wavy boundary.

A2—3 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; common fine distinct strong brown (7.5YR 5/6) mottles; strong fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine irregular pores; moderately acid; clear wavy boundary.

BA—13 to 21 inches; very dark grayish brown (10YR 3/2) silt loam, yellowish brown (10YR 5/4) dry; common fine prominent strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine irregular and tubular pores; few thin clay films on faces of peds and in pores; moderately acid; gradual smooth boundary.

Bw—21 to 31 inches; dark grayish brown (10YR 4/2) silty clay loam, pale brown (10YR 6/3) dry; common fine prominent strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; many fine tubular pores and common fine irregular pores; common thin clay films on faces of peds and few moderately thick clay films in pores; moderately acid; gradual smooth boundary.

BC—31 to 43 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) and reddish yellow (7.5YR 6/6) dry; many fine and medium prominent strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; common fine and few medium roots; many fine tubular pores; few thin clay films on faces of peds and few moderately thick clay films in pores; moderately acid; diffuse smooth boundary.

C—43 to 60 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) and reddish yellow (7.5YR 6/6) dry; many medium prominent strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; many fine and few medium tubular pores; moderately acid.

The mollic epipedon is 20 to 34 inches thick.

The A and BA horizons have value of 2 or 3 when moist and 4 or 5 when dry.

The Bw and BC horizons have hue of 7.5YR or 10YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 2 to 4 when moist or dry. Texture is silt loam, clay loam, or silty clay loam.

The C horizon has common to many, medium, prominent mottles.

McDoug Series

The McDoug series consists of very deep, moderately well drained soils on flood plains. These soils formed in mixed alluvium derived dominantly from basic igneous rock. Slope is 0 to 3 percent. Elevation is 800 to 1,600 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is 130 to 150 days.

These soils are fine-loamy, mixed, mesic Cumulic Ultic Haploxerolls.

Typical pedon of McDoug silt loam, about 4 miles north of Willard; 500 feet south and 1,200 feet east of the northwest corner of sec. 15, T. 4 N., R. 9 E.

Oi—1 inch to 0; leaves and twigs.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 3/3) dry; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; moderately acid; clear wavy boundary.

AB—6 to 12 inches; dark brown (10YR 3/3) silt loam, dark yellowish brown (10YR 4/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine irregular pores and few fine tubular pores; moderately acid; clear wavy boundary.

BA—12 to 25 inches; dark brown (10YR 3/3) clay loam, yellowish brown (10YR 5/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine and medium irregular pores and common fine and medium tubular pores; slightly acid; abrupt wavy boundary.

Bw—25 to 38 inches; dark yellowish brown (10YR 4/4) loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine, medium, and coarse roots; many fine irregular pores and common medium and coarse tubular pores; slightly acid; clear wavy boundary.

C—38 to 60 inches; dark yellowish brown (10YR 4/4) clay loam, light yellowish brown (10YR 6/4) dry; common medium distinct dark grayish brown (10YR 4/2) mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine and medium tubular pores; slightly acid.

The mollic epipedon is 24 to 30 inches thick. Depth to grayish brown mottles is 30 to 40 inches.

The A, AB, and BA horizons have hue of 7.5YR or 10YR, value of 2 or 3 when moist and 3 to 5 when dry, and chroma of 2 to 4 when moist or dry.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It is loam or clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It is clay loam or silt loam.

McElroy Series

The McElroy series consists of very deep, well drained soils on back slopes and foot slopes of mountains. These soils formed in colluvium derived dominantly from basalt with a mantle of volcanic ash. Slope is 5 to 65 percent. Elevation is 400 to 2,300 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 46 degrees F, and the average frost-free season is 105 to 125 days.

These soils are medial-skeletal, mesic Andic Xerumbrepts.

Typical pedon of McElroy gravelly loam, 30 to 65 percent slopes, about 2 miles south of Willard; 2,640 feet south and 300 feet west of the northeast corner of sec. 12, T. 3 N., R. 9 E.

O1—2 inches to 0.5 inch; needles, leaves, and twigs.

O2—0.5 inch to 0; decomposed organic material.

A1—0 to 4 inches; dark brown (7.5YR 3/2) gravelly loam, brown (7.5YR 5/4) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots; many fine irregular pores; 25 percent pebbles; moderately acid; abrupt smooth boundary.

A2—4 to 10 inches; dark brown (7.5YR 3/3) gravelly loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure parting to weak fine granular structure; soft, very friable, slightly sticky and nonplastic; weakly smeary; many very fine and fine roots; many fine irregular pores; 25 percent pebbles; moderately acid; clear wavy boundary.

BA—10 to 24 inches; dark brown (7.5YR 4/4) very gravelly loam, strong brown (7.5YR 5/6) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine and fine roots and few medium roots; common fine irregular and tubular pores; 30 percent pebbles and 10 percent cobbles; moderately acid; gradual wavy boundary.

Bw1—24 to 43 inches; dark brown (7.5YR 4/4) very cobbly loam, strong brown (7.5YR 5/6) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine and fine roots and few medium and coarse roots; common fine irregular pores and common fine and medium tubular pores; 30 percent pebbles and 20 percent cobbles; moderately acid; gradual wavy boundary.

Bw2—43 to 60 inches; dark brown (7.5YR 4/4) very cobbly loam, strong brown (7.5YR 5/6) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common fine tubular pores; 30 percent pebbles, 15 percent cobbles, and 5 percent stones; moderately acid.

The control section averages 35 to 60 percent rock fragments and 0 to 10 percent saprolitic fragments. Volcanic ash is most prominent in the upper 9 to 13 inches. The umbric epipedon is 10 to 13 inches thick. Reaction is moderately acid or slightly acid throughout.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 4 or 5 when dry. It is gravelly loam or very stony loam.

The BA horizon has hue of 7.5YR or 5YR, value of 4 or 5 when dry and 2 to 4 when moist, and chroma of 4 to 6 when moist or dry.

The Bw horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry, and chroma of 4 to 6 when dry. It is very gravelly loam, very cobbly loam, or extremely gravelly loam. It has 35 to 55 percent pebbles and 10 to 20 percent cobbles and stones.

Minniepeak Series

The Minniepeak series consists of very deep, well drained soils on back slopes and ridgetops of mountains. These soils formed in aerially deposited volcanic ash and pumice. Slope is 5 to 90 percent. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free season is 75 to 95 days.

These soils are cindery Entic Cryandepts.

Typical pedon of Minniepeak cindery sandy loam, 30 to 65 percent slopes, about 3 miles southwest of Curtis Lake; 900 feet south and 750 feet west of the northeast corner of sec. 20, T. 9 N., R. 6 E.

O—2 inches to 0; needles, leaves, and twigs.

A1—0 to 3 inches; dark brown (10YR 4/3) cindery sandy loam (volcanic ash and cinders), brown (10YR 5/3) dry; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots, common medium roots, and few coarse roots; common fine irregular pores; 20 percent pumice fragments; slightly acid; abrupt smooth boundary.

A2—3 to 8 inches; black (10YR 2/1) loamy sand (volcanic ash), dark gray (10YR 4/1) dry; single grain; loose; common fine and medium roots and few coarse roots; many very fine irregular pores; slightly acid; abrupt smooth boundary.

AB—8 to 12 inches; very dark gray (10YR 3/1) very cindery sandy loam (volcanic ash and cinders), gray (10YR 5/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots and common medium roots; many very fine irregular pores and few fine tubular pores, 40 percent pumice; slightly acid; abrupt smooth boundary.

2Bw1—12 to 16 inches; light gray (10YR 7/1) extremely cindery sand (cinders and volcanic ash), white (10YR 8/1) dry; common fine and medium stains that are yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) when dry; single grain; loose; many very fine and common fine roots; many coarse irregular pores; 75 percent pumice fragments and 15 percent pebbles; slightly acid; abrupt smooth boundary.

2Bw2—16 to 21 inches; dark brown (10YR 4/3) extremely cindery coarse sand (cinders and volcanic ash), brown (10YR 5/3) dry; single grain; loose; many very fine and fine roots and few coarse roots; many medium irregular pores; 60 percent pumice fragments and 10 percent pebbles; slightly acid; abrupt wavy boundary.

2Bw3—21 to 60 inches; light gray (10YR 7/1) extremely cindery sand (cinders and volcanic ash), white (10YR 8/1) dry; many fine and medium stains that are yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) when dry; single grain; loose; common very fine and few fine roots; many medium and coarse irregular pores; 80 percent pumice fragments and 10 percent pebbles; slightly acid.

The control section averages 60 to 80 percent pumice fragments and 5 to 20 percent pebbles. Reaction is moderately acid or slightly acid throughout.

The A1 horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 2 to 4 when moist or dry.

The A2 horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 1 or 2 when moist or dry. It is loamy sand or sandy loam. Content of scoria ranges from 0 to 15 percent.

The 2Bw1 horizon has 65 to 80 percent pumice fragments and 5 to 15 percent pebbles. It has stains that have hue of 10YR or 7.5YR, value of 4 or 5 when moist and 5 or 6 when dry, and chroma of 4 to 8 when moist or dry.

The 2Bw2 horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 2 or 3 when moist or dry. It has 50 to 65 percent pumice fragments and 10 to 30 percent pebbles that are 2 to 5 millimeters in size. The fine earth fraction is coarse sand, sand, or loamy sand.

The 2Bw3 horizon has 65 to 80 percent pumice fragments and 5 to 15 percent pebbles. It has stains that have hue of 10YR or 7.5YR, value of 4 or 5 when moist and 5 or 6 when dry, and chroma of 4 to 8 when moist or dry.

Mossyrock Series

The Mossyrock series consists of very deep, well drained soils on high terraces. These soils formed in loess and alluvium derived dominantly from volcanic ash and basalt. Slope is 2 to 15 percent. Elevation is 300 to 1,000 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 51 degrees F, and the average frost-free season is 175 to 195 days.

These soils are medial, mesic Typic Dystrandepts.

Typical pedon of Mossyrock silt loam, 2 to 5 percent slopes, about 6 miles northeast of Washougal; 2,190 feet south of the northeast corner of sec. 29, T. 2 N., R. 5 E.

O—1.5 inches to 0; needles, leaves, and twigs.

A1—0 to 6 inches; very dark brown (10YR 2/2) silt loam, dark brown (10YR 4/3) dry; weak coarse granular structure; soft, very friable, slightly sticky and nonplastic; weakly smeary; many very fine roots and common fine and medium roots; many medium irregular pores; moderately acid; clear wavy boundary.

A2—6 to 13 inches; dark brown (7.5YR 3/2) silt loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; weakly smeary; many very fine and fine roots and few medium roots; many medium irregular pores; moderately acid; clear wavy boundary.

AB—13 to 27 inches; dark brown (7.5YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; many very fine roots and common fine and medium roots; many medium irregular pores; moderately acid; clear wavy boundary.

Bw—27 to 60 inches; dark brown (7.5YR 4/4) silt loam, very pale brown (10YR 7/4) dry; weak medium prismatic structure; hard, firm, slightly sticky and slightly plastic; common fine and few very fine roots; many fine and common medium irregular pores; moderately acid.

The umbric epipedon is 24 to 30 inches thick. Volcanic ash influence generally extends to a depth of 60 inches or more.

The A and AB horizons have hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6 when moist and 5 to 7 when dry, and chroma of 3 or 4 when dry. Reaction is strongly acid or moderately acid.

Mountzion Series

The Mountzion series consists of very deep, well drained soils on back slopes and foot slopes of mountains. These soils formed in residuum and colluvium derived dominantly from basalt. Slope is 2 to 65 percent. Elevation is 600 to 2,200 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 49 degrees F, and the average frost-free season is 130 to 150 days.

These soils are fine-loamy, mixed, mesic Typic Haplohumults.

Typical pedon of Mountzion clay loam, 15 to 30 percent slopes, about 3 miles northeast of Stevenson; 1,300 feet south and 1,000 feet west of the northeast corner of sec. 24, T. 3 N., R. 7 1/2 E.

O—1 inch to 0; needles, leaves, and twigs.

A—0 to 5 inches; dark brown (7.5YR 3/2) clay loam, dark brown (7.5YR 4/4) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium roots; many fine irregular pores; 5 percent concretions; moderately acid; clear wavy boundary.

AB—5 to 17 inches; dark brown (7.5YR 3/3) clay loam, dark brown (7.5YR 4/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common fine tubular pores; 5 percent soft basalt pebbles; moderately acid; clear wavy boundary.

Bt1—17 to 35 inches; dark reddish brown (5YR 3/4) silty clay loam, reddish brown (5YR 4/4) dry; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common fine and medium roots and few coarse roots; common very fine and fine tubular pores; common moderately thick clay films on faces of peds and in some pores; strongly acid; gradual wavy boundary.

Bt2—35 to 47 inches; dark reddish brown (5YR 3/4) silty clay loam, yellowish red (5YR 4/6) dry; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common fine and medium roots; common fine tubular pores; many moderately thick clay films on faces of peds and in pores; strongly acid; gradual wavy boundary.

Bt3—47 to 60 inches; dark brown (7.5YR 4/4) clay loam, strong brown (7.5YR 5/6) dry; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores; few thin clay films on faces of peds; 10 percent pebbles; strongly acid.

The 17- to 37-inch particle-size control section is 28 to 35 percent clay. Depth to bedrock is 60 inches or more.

The A and AB horizons have hue of 7.5YR or 5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 or 3 when moist and 2 to 4 when dry. They have 0 to 10 percent pebbles and 0 to 15 percent concretions that are 2 to 5 millimeters in diameter. Reaction is strongly acid or moderately acid.

The Bt horizon has hue of 7.5YR or 5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 4 to 6 when dry. It has 5 to 20 percent pebbles. The horizon is clay loam or silty clay loam. Reaction is very strongly acid or strongly acid.

Obscurity Series

The Obscurity series consists of very deep, somewhat excessively drained soils on broad fans and low terraces along major drainageways. These soils formed in mudflow material. Slopes are 0 to 30 percent. Elevation is 2,800 to 5,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 40 degrees F, and the average frost-free season is 70 to 90 days.

These soils are sandy-skeletal, mixed Typic Cryorthents.

Typical pedon of Obscurity very bouldery sand, 0 to 30 percent slopes, about 3.5 miles southeast of Mount St. Helens; 2,000 feet north and 2,000 feet east of the southwest corner of sec. 19, T. 8 N., R. 6 E.

C1—0 to 20 inches; gray (10YR 5/1) very bouldery sand, light gray (10YR 7/1) dry; single grain; loose, nonsticky and nonplastic; many coarse irregular pores; 15 percent cobbles, 30 percent pebbles, and 3 percent boulders and stones on the soil surface; moderately acid; clear wavy boundary.

C2—20 to 60 inches; dark gray (10YR 4/1) very cobbly loamy sand with strata of cindery sand and very cindery loamy sand 2 to 4 inches thick, light gray

(10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse irregular pores; 5 percent stones, 30 percent cobbles, and 25 percent pebbles; 10 percent pumice fragments; moderately acid.

The mean annual soil temperature ranges from 39 to 44 degrees F. The 10- to 40-inch particle-size control section is weakly stratified and averages 35 to 65 percent coarse fragments and 15 to 50 percent volcanic glass and glass aggregates. It is strongly acid or moderately acid. Some profiles contain woody organic debris that consists of logs, branches, and bark.

The C1 horizon has hue of 7.5YR to 2.5Y, value of 3 to 7 when moist and 5 to 8 when dry, and chroma of 0 to 2 when moist or dry.

The C2 horizon has hue of 7.5YR to 2.5Y, value of 2 to 5 when moist and 3 to 6 when dry, and chroma of 0 to 2 when moist or dry. It is very cobbly loamy sand or very cobbly sand.

Panhandle Series

The Panhandle series consists of very deep, well drained soils on broad fans. These soils formed in cindery pyroclastic flow material. Slopes are 0 to 20 percent. Elevation is 2,900 to 5,000 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free season is 70 to 90 days.

These soils are cindery Typic Cryorthents.

Typical pedon of Panhandle extremely cindery loamy sand, 0 to 20 percent slopes, about 1.5 miles southwest f Spirit Lake; 1,000 feet south and 1,750 feet east of he northwest corner of sec. 21, T. 9 N., R. 5 E.

C1—0 to 10 inches; light gray (10YR 7/1) extremely cindery loamy sand, white (10YR 8/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse irregular pores; 50 percent pumice fragments and 15 percent pebbles; moderately alkaline; clear smooth boundary.

C2—10 to 60 inches; grayish brown (10YR 5/2) very cindery loamy sand, light gray (10YR 7/2) dry; single grain; loose, nonsticky and nonplastic; many fine, medium, and coarse irregular pores; 35 percent pumice fragments and 10 percent pebbles; moderately alkaline.

The mean annual soil temperature ranges from 38 to 3 degrees F. The 10- to 40-inch particle-size control ection averages 35 to 70 percent pumice fragments. It is mildly alkaline or neutral. The soil is 60 percent or more vitric volcanic ash and pumice cinders.

The C1 horizon has value of 4 to 7 when moist and 5 to 8 when dry, and it has chroma of 1 or 2 when moist or dry.

The C2 horizon has hue of 7.5YR to 10YR, value of 4 to 6 when moist and 5 to 8 when dry, and chroma of 0 to 2 when moist or dry.

Pelee Series

The Pelee series consists of very deep, well drained soils on back slopes and ridgetops of mountains. These soils formed in stratified, aerially deposited volcanic ash and pumice. Slope is 5 to 90 percent. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 75 to 90 days.

These soils are cindery Entic Cryandepts.

Typical pedon of Pelee sandy loam, 30 to 65 percent slopes (fig. 9), about 4.5 miles northeast of Mount St. Helens; 500 feet south and 1,700 feet east of the northwest corner of sec. 31, T. 9 N., R. 6 E.

O1—1.5 inches to 0.5 inch; leaves, needles, and twigs.

O2—0.5 inch to 0; decomposed organic material.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) very fine sandy loam (volcanic ash), light gray (10YR 7/2) dry; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium roots, and few coarse roots; common fine irregular pores; slightly acid; abrupt wavy boundary.

A2—2 to 7 inches; very dark grayish brown (10YR 3/2) sandy loam (volcanic ash), grayish brown (10YR 5/2) dry; many medium distinct dark brown (7.5YR 3/5) mottles on faces of peds; moderate medium platy structure parting to very fine subangular blocky; slightly hard, firm, nonsticky and nonplastic; many very fine and fine roots and few medium and coarse roots; common fine and medium irregular pores and common fine tubular pores; slightly acid; abrupt smooth boundary.

2BA—7 to 10 inches; dark gray (10YR 4/1) very cindery coarse sand (volcanic ash and cinders), gray (10YR 5/1) dry; single grain; loose; many very fine roots; many fine and medium irregular pores; 40 percent pumice fragments; moderately acid; abrupt smooth boundary.

2Bw1—10 to 15 inches; light gray (10YR 7/1) extremely cindery sand (cinders and volcanic ash), white

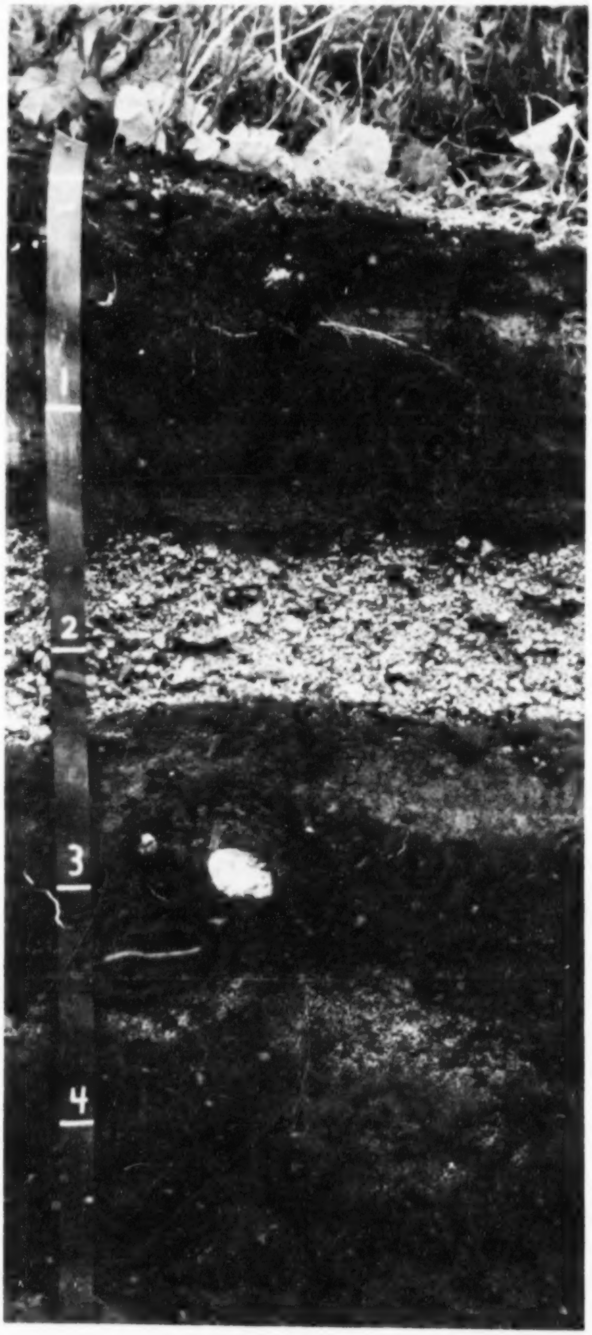


Figure 9.—Typical pedon of Pelee sandy loam, 30 to 65 percent slopes.

(10YR 8/1) dry; yellowish brown (10YR 5/6) iron stains; single grain; loose; many very fine roots; many medium and coarse irregular pores; 75 percent pumice fragments and 15 percent pebbles; moderately acid; abrupt smooth boundary.

2Bw2—15 to 20 inches; dark brown (10YR 4/3) very cindery sand (cinders and volcanic ash), light brownish gray (10YR 6/2) dry; single grain; loose; many very fine roots, common medium roots, and few coarse roots; many fine and medium irregular pores; 55 percent pumice fragments and 20 percent pebbles; moderately acid; abrupt smooth boundary.

2Bw3—20 to 32 inches; light gray (10YR 7/1) extremely cindery sand (cinders and volcanic ash), white (10YR 8/1) dry; yellowish brown (10YR 5/6) iron stains; single grain; loose; many very fine roots; common medium and many coarse irregular pores; 75 percent pumice fragments and 15 percent pebbles; moderately acid; abrupt wavy boundary.

3Bw4—32 to 42 inches; dark brown (7.5YR 3/4) sandy loam, dark brown (7.5YR 4/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and few medium roots; common very fine irregular pores; 5 percent pumice fragments and 15 percent scoria; moderately acid; abrupt wavy boundary.

3Bw5—42 to 52 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; common fine distinct yellow (10YR 7/6) mottles; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; continuous lenses of gravel-sized pumice fragments 1 to 3 inches thick; few very fine and fine roots; common very fine irregular pores; moderately acid; abrupt wavy boundary.

3Bw6—52 to 60 inches; dark brown (7.5YR 3/4) loamy sand, dark brown (7.5YR 4/4) dry; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine roots; common medium and coarse irregular pores; 55 percent scoria; moderately acid.

Depth to the lower boundary of the cindery layer is 25 to 35 inches. The 10- to 40-inch particle-size control section averages 35 to 60 percent pumice fragments and 5 to 20 percent rock fragments. The upper 25 to 35 inches of the profile is 60 percent or more vitric volcanic ash and pumice.

The A horizon has value of 3 or 4 when moist and 5 to 7 when dry, and it has chroma of 1 or 2 when moist or dry. The lower part has common to many, medium, distinct stains that have hue mainly of 7.5YR or 5YR.

The 2Bw horizon has 40 to 80 percent pumice fragments and 5 to 20 percent andesitic pebbles. It is loamy sand to coarse sand in the fine earth fraction. Iron stains on the pumice fragments have hue of 10YR or 7.5YR and value of 4 or 5 when moist.

The 3Bw horizon has hue of 10YR or 7.5YR, value of 2 to 4 when moist and 4 to 6 when dry, and chroma of 2 or 4 when moist or dry. Content of soft black scoria averages 10 to 35 percent. The horizon is sandy loam to loamy sand.

Pilchuck Series

The Pilchuck series consists of very deep, somewhat excessively drained soils on flood plains. These soils formed in alluvium derived dominantly from basic igneous rock. Slope is 0 to 3 percent. Elevation is 50 to 200 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 50 degrees F, and the average frost-free season is 160 to 200 days.

These soils are mixed, mesic Dystric Xeropsamments.

Typical pedon of Pilchuck very fine sandy loam, about 0.5 mile east of Beacon Rock; 1,000 feet south and 1,000 feet west of the northeast corner of sec. 30, T. 2 N., R. 7 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine and medium irregular pores and common fine and medium tubular pores; moderately acid; abrupt smooth boundary.

AC—9 to 18 inches; dark brown (10YR 4/3) fine sand, brown (10YR 5/3) dry; single grain; loose; many very fine and fine roots; many fine irregular pores and few medium tubular pores; stratified lenses of loamy fine sand; moderately acid; abrupt wavy boundary.

1—18 to 28 inches; dark brown (10YR 4/3) loamy fine sand, pale brown (10YR 6/3) dry; single grain; loose; common very fine and fine roots; many fine irregular pores and few medium tubular pores; moderately acid; abrupt smooth boundary.

2—28 to 38 inches; brown (10YR 5/3) fine sand, pale brown (10YR 6/3) dry; single grain; loose; common very fine and fine roots; many fine irregular pores and few coarse tubular pores; moderately acid; clear wavy boundary.

3—38 to 46 inches; dark grayish brown (10YR 4/2) loamy fine sand, pale brown (10YR 6/3) dry; few fine distinct dark brown (7.5YR 4/4) mottles; single grain; loose; common very fine and fine roots and few medium roots; many fine irregular pores and few medium tubular pores; moderately acid; abrupt wavy boundary.

C4—46 to 60 inches; very dark grayish brown (10YR 3/2) fine sandy loam, pale brown (10YR 6/3) dry; common fine distinct dark brown (7.5YR 4/4) and black (10YR 2/1) mottles; massive; soft, friable, nonsticky and nonplastic; common very fine and fine roots; many fine and medium irregular pores and common medium tubular pores; moderately acid.

Depth to stratified lenses of fine sand and loamy fine sand is 9 to 30 inches.

The A and AC horizons have value of 2 or 3 when moist and 4 or 5 when dry, and they have chroma of 2 or 3 when moist or dry.

The C1 horizon has value of 5 or 6 when dry, and it has chroma of 2 or 3 when moist or dry. It is fine sand, loamy sand, or loamy fine sand.

The C2 horizon has value of 4 or 5 when moist, and it has chroma of 2 or 3 when moist or dry. It is fine sand or coarse sand.

The C3 and C4 horizons have value of 3 or 4 when moist, and they have chroma of 2 or 3 when moist or dry. They are stratified lenses of loamy fine sand, sand, fine sandy loam, or silt loam. Mottles range from common to many and faint to distinct and have hue of 2.5YR, 7.5YR, or 10YR.

Pillery Series

The Pillery series consists of very deep, moderately well drained soils on flood plains and low river terraces. These soils formed in mixed alluvium derived dominantly from basic igneous rock. Slope is 0 to 3 percent. Elevation is 900 to 1,200 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 46 degrees F, and the average frost-free season is 110 to 130 days.

These soils are coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents.

Typical pedon of Pillery fine sandy loam, about 3 miles north of Willard; 2,000 feet south and 1,000 feet east of the northwest corner of sec. 23, R. 7 E., T. 4 N.

O—1 inch to 0; leaves, needles, and twigs.

A1—0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine and very fine roots and few medium roots; many very fine and fine irregular pores; 5 percent pebbles and 5 percent concretions; moderately acid; clear wavy boundary.

A2—9 to 20 inches; very dark grayish brown (10YR 3/2) loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine roots and few fine and medium roots; common fine irregular pores and few fine vesicular pores; 10 percent pebbles; lenses of fine sandy loam; moderately acid; clear smooth boundary.

A3—20 to 32 inches; dark brown (10YR 3/3) fine sandy loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine and common medium roots; common fine irregular and vesicular pores; 5 percent pebbles; strongly acid; clear wavy boundary.

C1—32 to 45 inches; brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine and medium roots; common fine irregular pores and common fine vesicular pores; 10 percent pebbles; strongly acid; clear wavy boundary.

2C2—45 to 60 inches; brown (10YR 5/3) very gravelly loamy sand, very pale brown (10YR 7/3) dry; single grain; loose; few medium and coarse roots; many very fine, fine, and medium irregular pores; 40 percent pebbles and 10 percent cobbles; moderately acid.

The 10- to 40-inch particle-size control section is stratified fine sandy loam, loam, silt loam, and loamy fine sand and has 5 to 15 percent clay and 15 to 40 percent sand that is fine sand or coarser.

The A horizon has hue of 7.5YR or 10YR, and it has value of 3 or 4 when moist and 5 or 6 when dry.

The C horizon has hue of 7.5YR or 10YR and value of 3 or 4 when moist. Reaction is strongly acid or moderately acid. The horizon has 5 to 15 percent rock fragments.

The 2C horizon is very gravelly loamy sand or gravelly sand. It has 25 to 40 percent pebbles and 0 to 10 percent cobbles.

Pinchot Series

The Pinchot series consists of very deep, well drained soils on terraces and terrace escarpments. These soils formed in layers of aerially deposited pumice and volcanic ash over lahar material and alluvial sand and gravel. Slope is 0 to 90 percent. Elevation is 1,000 to 1,600 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 50 degrees F, and the frost-free season is 100 to 120 days.

These soils are ashy, mesic Typic Vitrandepts.

Typical pedon of Pinchot cindery sandy loam, 0 to 30 percent slopes, north of Forest Service Road N-90, about 5 miles southeast of Marble Mountain; 1,000 feet south and 1,600 feet west of the northeast corner of sec. 23, T. 7 N., R. 6 E.

A1—0 to 2 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine irregular pores; moderately acid; abrupt wavy boundary.

A2—2 to 4 inches; dark brown (10YR 3/3) cindery silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; weakly smeary; many very fine and fine roots and common medium roots; common fine irregular pores; 20 percent pumice fragments; moderately acid; abrupt wavy boundary.

2Bw1—4 to 6 inches; light brownish gray (10YR 6/2) extremely cindery coarse sand, light gray (10YR 7/2) dry; yellowish brown (10YR 5/6) iron stains; single grain; loose; many very fine and fine roots and few medium roots; many medium and coarse irregular pores; 65 percent pumice fragments and 15 percent pebbles; moderately acid; abrupt wavy boundary.

3Bw2—6 to 11 inches; very dark grayish brown (10YR 3/2) fine sandy loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots and common medium roots; many very fine irregular pores; 10 percent pumice fragments; moderately acid; abrupt wavy boundary.

3Bw3—11 to 25 inches; dark brown (10YR 3/3) cindery sandy loam, brown (10YR 5/3) dry; common fine distinct brownish yellow (10YR 6/8) mottles; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine, fine, and medium roots and few coarse roots; many fine irregular pores and common fine tubular pores; 25 percent pumice fragments; moderately acid; gradual wavy boundary.

3Bw4—25 to 34 inches; dark brown (10YR 3/3) sandy loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots and common medium roots; many fine irregular pores and common fine tubular pores; 15 percent pebbles; slightly acid; abrupt smooth boundary.

4C1—34 to 49 inches; dark brown (10YR 4/3) very gravelly loamy sand, pale brown (10YR 6/3) dry; single grain; loose; many very fine and fine roots; many fine and common medium irregular pores; 40 percent pebbles, 10 percent cobbles, and 5 percent stones; moderately acid; clear smooth boundary.

4C2—49 to 60 inches; brown (10YR 5/3) very cobbly sand, pale brown (10YR 6/3) dry; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; many fine and medium irregular pores; 25 percent hard pebbles, 20 percent saprolitic pebbles, 15 percent cobbles, and 5 percent stones; moderately acid.

The upper part of the 10- to 40-inch particle-size ontrol section is 60 percent or more vitric volcanic ash nd pumice and averages 5 to 10 percent hard rock agments and 10 to 25 percent pumice fragments. epth to the very gravelly or very cobbly 4C horizon is 5 to 40 inches. The lower part of the particle-size ontrol section averages 45 to 75 percent hard rock agments. Reaction is moderately acid or slightly acid roughout the profile.

The A horizon has value of 2 to 4 when moist and 4 6 when dry, and it has chroma of 1 to 4 when moist dry. It averages 5 to 15 percent pumice fragments.

The 2Bw horizon has 60 to 75 percent pumice gments and 5 to 15 percent pebbles. It has iron ins that have hue of 10YR or 7.5YR and value of 5 6 when moist.

The 3Bw horizon has hue of 7.5YR or 10YR, value of r 4 when moist and 5 or 6 when dry, and chroma of o 4 when moist or dry. It is fine sandy loam or sandy m. The horizon averages 10 to 25 percent pumice gments and 5 to 10 percent hard rock fragments.

The 4C horizon averages 40 to 80 percent rock ments, including 35 to 50 percent pebbles, 5 to 20 cent cobbles, and 2 to 10 percent stones. It is sand oamy sand.

oty Series

he Pinoty series consists of very deep, well drained on terraces. These soils formed in volcanic ash pumice over lahar material and alluvial sand and el. Slope is 0 to 30 percent. Elevation is 1,000 to 1,500 feet. The average annual precipitation is about 120 inches, the average annual air temperature is 52 degrees F, and the average frost-free season is 100 to 120 days.

These soils are ashy over medial, mesic Typic Vitrandepts.

Typical pedon of Pinoty sandy loam, 0 to 30 percent slopes, about 5 miles southeast of Marble Mountain; 2,500 feet south and 400 feet west of the northeast corner of sec. 14, T. 7 N., R. 6 E.

O1—2 inches to 0.5 inch; needles, leaves, and twigs.

O2—0.5 inch to 0; decomposed organic material.

A—0 to 3 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and common fine and medium roots; many very fine irregular pores; slightly acid; clear wavy boundary.

AB—3 to 4 inches; dark brown (10YR 3/3) cindery loamy sand, brown (10YR 5/3) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few coarse roots; many fine irregular pores; 20 percent pumice fragments; slightly acid; clear wavy boundary.

Bw1—4 to 9 inches; dark grayish brown (10YR 4/2) sandy loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine roots and common fine and medium roots; many fine irregular pores; 5 percent pumice fragments; neutral; clear wavy boundary.

Bw2—9 to 21 inches; dark grayish brown (10YR 4/2) cindery loamy sand, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots and common medium roots; many fine and medium irregular pores; 20 percent pumice fragments; neutral; clear wavy boundary.

Bw3—21 to 30 inches; dark yellowish brown (10YR 4/4) sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; many very fine, fine, and medium roots; many very fine irregular pores; 10 percent pumice fragments; neutral; clear wavy boundary.

C1—30 to 45 inches; brown (10YR 5/3) sandy loam, pale brown (10YR 6/3) dry; massive; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common fine irregular pores and few fine tubular pores; neutral; abrupt smooth boundary.

2C2—45 to 60 inches; grayish brown (10YR 5/2) extremely gravelly loamy sand, light brownish gray (10YR 6/2) dry; single grain; loose; many very fine and fine and common medium irregular pores; 55 percent pebbles and 15 percent cobbles; neutral.

Depth to the 2C2 horizon ranges from 40 to 50 inches. Reaction is slightly acid or neutral throughout the profile.

The Bw horizon has value of 3 or 4 when moist and 5 to 7 when dry, and it has chroma of 2 to 4 when moist or dry. It is sandy loam, cindery sandy loam, or cindery loamy sand. The horizon has 0 to 20 percent pumice fragments.

The 2C2 horizon has value of 5 or 6 when moist and 6 or 7 when dry, and it has chroma of 2 or 3 when moist or dry. It is very gravelly sand, extremely gravelly loamy sand, or extremely gravelly sand. The horizon has 40 to 60 percent pebbles and 5 to 15 percent cobbles.

Polepatch Series

The Polepatch series consists of very deep, somewhat excessively drained soils on alluvial fans and terraces. These soils formed in lahar material with a thin layer of volcanic ash on the surface. Slope is 0 to 30 percent. Elevation is 2,800 to 4,600 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the average frost-free season is 70 to 90 days.

These soils are sandy-skeletal, mixed Typic Cryorthents.

Typical pedon of Polepatch extremely bouldery loamy sand, 0 to 30 percent slopes, near Pine Creek on Forest Service Road N-83; about 2,000 feet south and 800 feet west of the northeast corner of sec. 30, T. 8 N., R. 6 E.

O—1 inch to 0; loose partially decomposed organic litter.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) extremely bouldery loamy sand, gray (10YR 5/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many fine irregular pores; 25 percent pebbles, 10 percent cobbles, and 5 percent stones; boulders on 3 percent of surface; moderately acid; clear wavy boundary.

AC—3 to 12 inches; very dark grayish brown (10YR 3/2) extremely cobbly loamy sand, gray (10YR 6/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium roots, and few coarse roots; many fine irregular pores; 30 percent pebbles, 25 percent cobbles, and 10 percent stones; moderately acid; clear wavy boundary.

2C1—12 to 27 inches; dark gray (10YR 4/1) extremely cobbly sand, light gray (10YR 7/1) dry; single grain; loose; many very fine and fine roots and few medium roots; many medium and coarse irregular pores; 30 percent pebbles, 25 percent cobbles, and 10 percent stones; slightly acid; abrupt wavy boundary.

2C2—27 to 35 inches; dark gray (10YR 4/1) extremely cobbly sand, light gray (10YR 7/1) dry; single grain; loose; few fine roots; many medium and coarse irregular pores; 40 percent pebbles, 20 percent cobbles, and 5 percent stones; slightly acid; abrupt wavy boundary.

3C3—35 to 40 inches; dark gray (10YR 4/1) fine sandy loam, light brownish gray (10YR 6/2) dry; massive; soft, friable, nonsticky and nonplastic; few fine irregular pores and common fine tubular pores; slightly acid; abrupt wavy boundary.

4C4—40 to 60 inches; dark gray (10YR 4/1) extremely stony coarse sand, light gray (10YR 7/1) dry; single grain; loose; many medium and coarse irregular pores; 35 percent pebbles, 20 percent cobbles, and 20 percent stones; slightly acid.

The 10- to 40-inch particle-size control section averages 60 to 85 percent rock fragments. Reaction is moderately acid or slightly acid throughout.

The A and AC horizons have value of 2 or 3 when moist and 5 or 6 when dry, and they have chroma of 1 or 2 when moist or dry. They are 20 to 30 percent pebbles, 10 to 25 percent cobbles, and 5 to 10 percent stones. From 3 to 5 percent of the surface is covered with boulders.

The C horizon has value of 4 or 5 when moist and 6 to 8 when dry, and it has chroma of 1 or 2 when moist or dry. It averages 30 to 40 percent pebbles, 20 to 30 percent cobbles, and 5 to 20 percent stones. It is extremely cobbly loamy sand, extremely cobbly fine sandy loam, extremely cobbly sand, or extremely stony coarse sand.

Shoestring Series

The Shoestring series consists of very deep, well drained soils on terraces and terrace escarpments. These soils formed in layers of aerially deposited volcanic ash and pumice over pyroclastic flow and lahar material. Slope is 0 to 90 percent. Elevation is 2,700 to 4,500 feet. The average annual precipitation is about 130 inches, the average annual air temperature is about 41 degrees F, and the average frost-free season is 70 to 90 days.

These soils are medial over sandy or sandy-skeletal, mixed Typic Cryorthods.

Typical pedon of Shoestring fine sandy loam, 0 to 30 percent slopes, about 2 miles north of Marble Mountain; 1,200 feet south and 1,700 feet west of the northeast corner of sec. 36, T. 8 N., R. 5 E.

O1—3 to 2 inches; leaves, needles, and twigs.

O2—2 inches to 0; decomposed organic material.

E—0 to 3 inches; very dark gray (10YR 3/1) fine sandy loam (volcanic ash), gray (10YR 5/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots and few coarse roots; many very fine irregular pores; strongly acid; abrupt smooth boundary.

Bhs—3 to 5 inches; black (10YR 2/1) fine sandy loam (volcanic ash), dark brown (10YR 3/3) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine, fine, and medium roots and few coarse roots; many very fine and fine irregular pores; 10 percent pebbles; moderately acid; abrupt smooth boundary.

2Bs1—5 to 8 inches; dark gray (10YR 4/1) very gravelly sand (volcanic ash and cinders), light gray (10YR 7/1) dry; yellowish brown (10YR 5/6) stains; single grain; loose; many very fine and fine roots and common medium roots; many coarse irregular pores; 45 percent pebbles and 35 percent pumice fragments; moderately acid; abrupt smooth boundary.

3Bs2—8 to 18 inches; dark brown (7.5YR 3/4) sandy loam, brownish yellow (10YR 6/6) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; common fine and medium roots and few coarse roots; many fine irregular pores and common fine tubular pores; moderately acid; clear wavy boundary.

3BC—18 to 24 inches; very dark brown (10YR 2/2) loamy sand, dark brown (10YR 4/3) dry; massive; slightly hard, firm, nonsticky and nonplastic; few fine roots; common fine and medium irregular pores; 30 percent soft scoria; slightly acid; clear smooth boundary.

C1—24 to 32 inches; dark grayish brown (10YR 4/2) very cobbly sand, brown (10YR 5/3) dry; single grain; loose; few fine roots; many medium and coarse irregular pores; 25 percent pebbles and 15 percent cobbles; slightly acid; clear smooth boundary.

4C2—32 to 60 inches; dark gray (10YR 4/1) very gravelly sand, gray (10YR 6/1) dry; single grain; loose; few fine roots; many medium and coarse irregular pores; 30 percent pebbles, 10 percent cobbles, and 5 percent stones; slightly acid.

Depth to the 4C horizon is 20 to 35 inches. The upper part of the 10- to 40-inch particle-control section is 30 to 60 percent vitric material and has 0 to 10 percent rock fragments. The lower part is 35 to 60 percent rock fragments. The B and C horizons are moderately acid or slightly acid.

The E horizon has value of 2 to 4 when moist and 4 to 6 when dry, and it has chroma of 1 or 2 when moist or dry.

The Bhs horizon has value of 2 or 3 when moist and 3 or 4 when dry, and it has chroma of 1 to 3 when moist or dry.

The 2Bs horizon has 30 to 45 percent pebbles and 30 to 45 percent pumice fragments. Iron stains on the pumice fragments have hue of 10YR or 7.5YR and value of 5 or 6.

The 3Bs horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 to 6 when moist or dry. It is mainly sandy loam or loamy sand and has intermittent lenses of loam.

The 3BC horizon has value of 2 to 4 when moist and 4 or 5 when dry, and it has chroma of 1 to 3 when moist or dry. It is loamy sand or sandy loam and has 15 to 35 percent soft scoria that can be crushed easily.

The 4C horizon has value of 4 to 6 when moist and 5 to 8 when dry, and it has chroma of 1 to 3 when moist or dry. It is very gravelly sand or very cobbly sand. The horizon averages 35 to 60 percent rock fragments, including 25 to 40 percent pebbles, 5 to 20 percent cobbles, and 0 to 5 percent stones.

Sinnice Series

The Sinnice series consists of very deep, well drained soils on foot slopes, back slopes, and ridgetops of mountains. These soils formed in layers of aerially deposited volcanic ash and pumice. Slope is 5 to 90 percent. Elevation is 2,800 to 5,000 feet. The average annual precipitation is about 125 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 75 to 90 days.

These soils are ashy over cindery Entic Cryandepts.

Typical pedon of Sinnice extremely cindery loamy

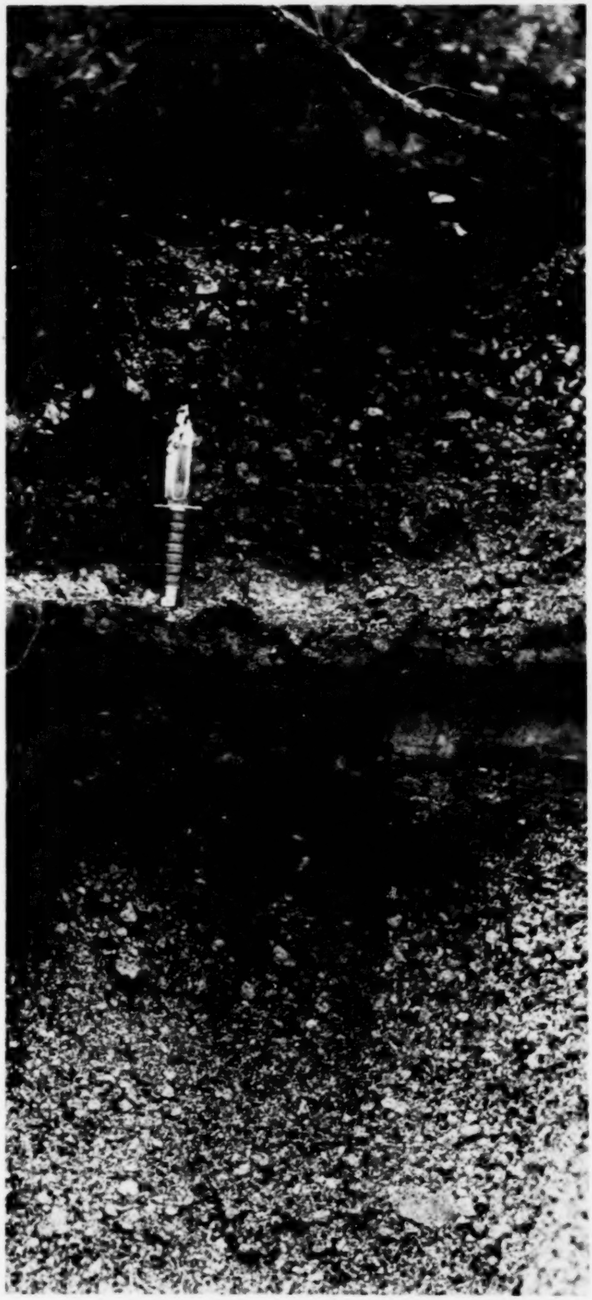


Figure 10.—Typical pedon of Sinnice extremely cindery loamy sand, 30 to 65 percent slopes.

sand, 30 to 65 percent slopes (fig. 10), on Forest Service Road N92H, about 1.5 miles northeast of Mount St. Helens; 1,250 feet south and 1,100 feet west of the northeast corner of sec. 19, T. 9 N., R. 6 E.

O—0.25 inch to 0; leaves, twigs, and needles.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) cindery very fine sandy loam (volcanic ash and cinders), gray (10YR 6/1) dry; single grain; loose; many very fine roots; few fine irregular and tubular pores; 30 percent pumice fragments; slightly acid; clear smooth boundary.

BE—1 inch to 7 inches; light gray (10YR 7/1) extremely cindery loamy sand (cinders and volcanic ash), white (10YR 8/1) dry; common fine distinct stains that are brownish yellow (10YR 6/8) and yellow (10YR 7/8) when dry; single grain; loose; many very fine and few medium roots; many medium and coarse irregular pores; 70 percent pumice fragments and 10 percent pebbles; slightly acid; abrupt smooth boundary.

2Bw1—7 to 9 inches; dark brown (10YR 3/3) fine sandy loam (volcanic ash), light gray (10YR 7/2) dry; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and common medium roots; common fine irregular pores; slightly acid; abrupt smooth boundary.

2Bw2—9 to 15 inches; very dark brown (10YR 2/2) loamy sand (volcanic ash), very dark grayish brown (10YR 3/2) dry; single grain; soft, very friable, nonsticky and nonplastic; many very fine roots, common medium roots, and few coarse roots; common fine irregular pores; slightly acid; abrupt smooth boundary.

3C—15 to 60 inches; light gray (10YR 7/1) extremely cindery sand (cinders and volcanic ash), white (10YR 8/1) dry; many fine and medium distinct stains that are brownish yellow (10YR 6/8) and yellow (10YR 7/8) when dry; single grain; loose; common fine and few coarse roots; many medium and coarse irregular pores; 75 percent pumice fragments and 15 percent pebbles 2 to 10 millimeters in diameter; slightly acid.

The 10- to 40-inch particle-size control section averages more than 60 percent vitric volcanic ash and cinders. The ash layer is 8 to 12 inches thick and extends to a depth of 14 to 21 inches. The lower part of the control section averages 60 to 80 percent cinders and 5 to 15 percent pebbles.

The A horizon has value of 2 or 3 when moist and 5 or 6 when dry and has chroma of 1 or 2 when moist or dry.

The BE horizon has stains that have hue of 10YR or 7.5YR and value of 5 to 7 when moist and 6 to 8 when dry. The horizon has chroma of 3 to 8 when moist or dry.

The 2Bw horizon has value of 2 or 3 when moist and 3 to 7 when dry, and it has chroma of 1 to 4 when moist or dry. It is stratified fine sandy loam, sandy loam, and loamy sand and has 0 to 15 percent pumice fragments.

The 3C horizon has 65 to 80 percent pumice fragments and 5 to 15 percent pebbles. It has stains that have hue of 10YR or 7.5YR and value of 5 to 7 when moist and 6 to 8 when dry. The horizon has chroma of 3 to 8 when moist or dry.

Skamania Series

The Skamania series consists of very deep, well drained soils on terraces and terrace escarpments. These soils formed in mixed alluvium derived from basalt, andesite, and some volcanic ash. Slope is 0 to 40 percent. Elevation is 200 to 800 feet. The average annual precipitation is about 70 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is 110 to 160 days.

These soils are coarse-loamy, mixed, mesic Typic Xerumbrepts.

Typical pedon of Skamania very fine sandy loam, 0 to 8 percent slopes, about 1.5 miles north of Carson, 1,600 feet south and 1,200 feet east of the northwest corner of sec. 17, T. 3 N., R. 8 E.

O1—1.5 inches to 0.5 inch; litter composed of needles, leaves, and twigs.

O2—0.5 inch to 0; decomposed organic material.

A1—0 to 2 inches; very dark brown (10YR 2/2) very fine sandy loam, dark brown (10YR 4/3) dry; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; many fine and medium and common coarse irregular pores; moderately acid; clear wavy boundary.

A2—2 to 10 inches; dark brown (7.5YR 3/2) very fine sandy loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots and few coarse roots; many fine and medium and common coarse irregular pores; 5 percent pebbles 2 to 4 millimeters in diameter; moderately acid; clear wavy boundary.

Bw1—10 to 27 inches; dark yellowish brown (10YR 3/4) very fine sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many fine and medium roots and few coarse roots; many fine and common medium irregular pores; moderately acid; gradual wavy boundary.

Bw2—27 to 43 inches; dark brown (7.5YR 4/4) fine sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine roots and common medium and coarse roots; common fine and medium irregular pores; slightly acid; abrupt wavy boundary.

C1—43 to 51 inches; dark yellowish brown (10YR 4/4) loamy fine sand, light yellowish brown (10YR 6/4) dry; massive; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; many fine and common medium irregular pores; slightly acid; clear wavy boundary.

C2—51 to 60 inches; dark yellowish brown (10YR 4/4) loamy fine sand, light yellowish brown (10YR 6/4) dry; massive; soft, very friable, nonsticky and nonplastic; common fine and medium roots and few coarse roots; many medium and common coarse irregular pores; moderately acid.

The umbric epipedon is 10 to 15 inches thick. The 10- to 40-inch particle-size control section is 5 to 15 percent clay and 15 to 35 percent sand that is coarser than very fine sand. Reaction is moderately acid or slightly acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist and 3 or 4 when dry.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 6 or 7 when dry, and chroma of 3 or 4 when moist and 4 or 5 when dry. It is very fine sandy loam, fine sandy loam, or loam.

The C horizon has value of 3 or 4 when moist and 6 or 7 when dry, and it has chroma of 3 or 4 when moist or dry. It is loamy fine sand or fine sandy loam.

Skelida Series

The Skelida series consists of very deep, well drained soils on terraces and terrace escarpments. These soils formed in loess and alluvium derived dominantly from basalt and andesite. Slope is 5 to 30 percent. Elevation is 400 to 1,000 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 50 degrees F, and the average frost-free season is 160 to 180 days.

These soils are fine-silty, mixed, mesic Typic Xerumbrepts.

Typical pedon of Skelida silt loam, 15 to 30 percent slopes, about 4 miles east of Washougal; 300 feet south and 2,640 feet west of the northeast corner of sec. 17, T. 1 N., R. 5 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 4/3) dry; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine irregular pores; moderately acid; clear wavy boundary.

A—7 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common fine and medium irregular pores; moderately acid; clear wavy boundary.

BA—15 to 20 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots and common fine roots; common fine and medium irregular pores; moderately acid; abrupt wavy boundary.

Bw1—20 to 43 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many very fine and fine irregular pores; moderately acid; clear wavy boundary.

Bw2—43 to 60 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine irregular pores; moderately acid.

The umbric epipedon is 10 to 16 inches thick. The solum is more than 60 inches thick. The control section is 18 to 25 percent clay. Less than 15 percent of the 10- to 40-inch particle-size control section is sand that is coarser than very fine sand.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 3 or 4 when dry. The B horizon has hue of 7.5YR or 10YR.

Skoly Series

The Skoly series consists of very deep, well drained soils on mountain slopes. These soils formed in colluvium derived from basalt. Slope is 2 to 65 percent. Elevation is 200 to 2,200 feet. The average annual precipitation is about 80 inches, the average annual temperature is about 50 degrees F, and the average frost-free season is 110 to 160 days.

These soils are loamy-skeletal, mixed, mesic Typic Haplumbrepts.

Typical pedon of Skoly stony loam, 2 to 15 percent slopes, about 5 miles west of Beacon Rock State Park; 500 feet south and 100 feet west of the northeast corner of sec. 30, T. 2 N., R. 6 E.

O—3 inches to 0; leaves, needles, and twigs.

A—0 to 5 inches; dark brown (7.5YR 3/2) stony loam, dark brown (7.5YR 4/2) dry; strong fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and common coarse roots; many very fine, fine, and medium irregular pores; 15 percent pebbles, 10 percent cobbles, 2 percent stones, and 5 percent soft saprolitic pebbles; strongly acid; clear wavy boundary.

AB—5 to 17 inches; dark brown (7.5YR 3/2) very cobbly loam, dark brown (7.5YR 4/2) dry; moderate fine granular structure and weak subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; common fine tubular pores and common very fine irregular pores; 10 percent pebbles, 35 percent cobbles, and 5 percent soft saprolitic pebbles; strongly acid; clear irregular boundary.

Bw—17 to 40 inches; dark brown (7.5YR 3/4) very cobbly loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common fine tubular pores; 10 percent pebbles, 35 percent cobbles, and 20 percent soft saprolitic pebbles; strongly acid; gradual wavy boundary.

BC—40 to 60 inches; dark brown (7.5YR 3/4) very cobbly loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine roots; common fine tubular pores; 10 percent pebbles, 35 percent cobbles, and 10 percent stones; strongly acid.

The 10- to 40-inch particle-size control section averages 18 to 30 percent clay, 35 to 60 percent rock fragments, and 5 to 25 percent saprolitic fragments.

ness of the umbric epipedon ranges from 14 to 20
s.
e A horizon has hue of 5YR or 7.5YR, value of 2
vhen moist and 3 to 5 when dry, and chroma of 2
vhen moist or dry. From 2 to 10 percent of the
ce is covered with stones.
e Bw horizon has hue of 5YR or 7.5YR, value of 3
vhen moist and 4 to 6 when dry, and chroma of 3
vhen moist or dry. It is very cobbly loam, very
lly clay loam, or very cobbly clay loam.
e BC horizon has value of 3 or 4 when moist and
6 when dry. It is very cobbly loam, very cobbly clay
or extremely cobbly loam. It has 10 to 20 percent
es and 40 to 50 percent cobbles and stones.

lelens Series

e St. Helens series consists of very deep, well
ed soils on terraces. These soils formed in layers
ially deposited pumice and volcanic ash over
lastic flow and lahar material. Slope is 0 to 30
nt. Elevation is 1,600 to 2,800 feet. The average
l precipitation is about 130 inches, the average
l air temperature is about 44 degrees F, and the
ree season is 90 to 110 days.
ese soils are ashy, frigid Typic Vitrandepts.
oical pedon of St. Helens sandy loam, 0 to 30
nt slopes, near Pine Creek, 1,200 feet south and
feet east of the northwest corner of sec. 4, T. 7
6 E.

inch to 0; loose, partially decomposed organic
ter consisting of needles, leaves, twigs, cones,
nd bark.
to 2 inches; dark grayish brown (10YR 4/2) sandy
am (volcanic ash), gray (10YR 6/1) dry; weak fine
anular structure; soft, friable, nonsticky and
nplastic; many very fine roots and common fine
d medium roots; many very fine irregular pores;
oderately acid; abrupt smooth boundary.
-2 to 4 inches; very dark brown (10YR 2/2) sandy
am (volcanic ash), very dark grayish brown (10YR
2) dry; weak fine granular structure; soft, friable,
nsticky and nonplastic; many very fine roots and
mmon fine and medium roots; many very fine
egular pores; moderately acid; abrupt smooth
undary.
4 to 6 inches; very dark grayish brown (10YR
2) loamy sand (volcanic ash), light brownish gray
0YR 6/2) dry; weak fine subangular blocky
ucture; soft, friable, nonsticky and nonplastic;

many very fine roots and common fine and medium roots; many very fine irregular pores; 10 percent pumice fragments; moderately acid; abrupt smooth boundary.

2Bw3—6 to 9 inches; light brownish gray (10YR 6/2) extremely cindery loamy sand (cinders and volcanic ash), light gray (10YR 7/2) dry; light yellowish brown (10YR 6/4) stains; single grain; loose; many very fine roots; many medium and coarse irregular pores; 80 percent rounded and subangular pumice fragments 2 to 15 millimeters in diameter and 5percent pebbles; slightly acid; abrupt smooth boundary.

3Bw4—9 to 18 inches; dark brown (10YR 3/3) sandy loam (volcanic ash), pale brown (10YR 6/3) dry; moderate fine and medium subangular blocky structure; soft, friable, nonsticky and slightly plastic; weakly smeary; few fine roots and common medium roots; many very fine irregular pores; 10 percent angular and subangular pumice fragments 2 to 5 millimeters in diameter; slightly acid; abrupt smooth boundary.

4BC—18 to 28 inches; dark grayish brown (10YR 4/2) sand (volcanic ash), light brownish gray (10YR 6/2) dry; single grain; loose; few medium and fine roots; many fine and medium irregular pores; 10 percent angular and subangular pumice fragments 2 to 10 millimeters in diameter; slightly acid; gradual smooth boundary.

5C—28 to 60 inches; dark grayish brown (10YR 4/2) very gravelly coarse sand, gray (10YR 6/1) dry; massive; hard, firm, nonsticky and nonplastic; many medium and coarse irregular pores; 50 percent pebbles and 10 percent cobbles; slightly acid.

Depth to the 5C horizon is 20 to 35 inches. The upper part of the 10- to 40-inch particle-size control section is more than 60 percent vitric volcanic ash and has 0 to 10 percent rock fragments. The lower part averages 35 to 65 percent rock fragments. The B and C horizons are moderately acid or slightly acid.

The E horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 1 or 2 when moist or dry.

The Bw horizon has value of 2 or 3 when moist and 3 to 6 when dry, and it has chroma of 1 to 3 when moist or dry. It averages 5 to 15 percent pumice fragments.

The 2Bw horizon has 60 to 85 percent pumice fragments and 5 to 15 percent pebbles. It has iron stains that have hue of 10YR or 7.5YR and value of 5 or 6.

The 3Bw horizon has hue of 10YR or 7.5YR and value of 3 or 4 when moist. It is sandy loam or fine sandy loam.

The 4BC horizon has 5 to 15 percent pumice fragments. It is sand or loamy sand.

The 5C horizon has 30 to 50 percent pebbles and 5 to 15 percent cobbles.

St. Martin Series

The St. Martin series consists of very deep, moderately well drained soils on back slopes, foot slopes, and toe slopes of mountains that have been disturbed by landslides. These soils formed in colluvium derived from andesite. Slope is 2 to 65 percent. Elevation is 300 to 2,000 feet. The average annual precipitation is about 55 inches, the average annual temperature is about 47 degrees F, and the average frost-free season is 100 to 140 days.

These soils are fine, montmorillonitic, mesic Aquic Hapludolls.

Typical pedon of St. Martin gravelly silty clay loam, 15 to 30 percent slopes, about 0.25 mile northwest of Collins; 2,500 feet south and 900 feet west of the northeast corner of sec. 36, T. 3 N., R. 8 E.

O—2 inches to 0; needles, leaves, and twigs.

A—0 to 4 inches; black (10YR 2/1) gravelly silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; soft, friable, slightly sticky and plastic; many very fine and fine roots and few medium roots; common fine irregular pores; 20 percent pebbles; neutral; clear smooth boundary.

BAt—4 to 11 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine, fine, and medium roots; many very fine irregular pores; 20 percent soft saprolitic andesite fragments; slightly acid; clear smooth boundary.

Bt1—11 to 25 inches; light olive brown (2.5Y 5/4) clay, light yellowish brown (10YR 6/4) dry; few fine faint mottles that are dark grayish brown (2.5Y 4/2) when moist and light olive brown (2.5Y 5/4) when dry; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common fine and medium roots; common very fine irregular pores and common fine tubular pores; 35 percent soft saprolitic andesite fragments; slightly acid; gradual smooth boundary.

Bt2—25 to 60 inches; light yellowish brown (2.5Y 6/4) clay, light yellowish brown (10YR 6/4) dry; few fine faint mottles that are dark grayish brown (2.5Y 4/2) when moist and light olive brown (2.5Y 5/4) when dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; common fine irregular and tubular pores; 45 percent soft saprolitic andesite fragments; moderately acid.

The mollic epipedon is 10 to 17 inches thick. The 10- to 40-inch particle-size control section averages 0 to 15 percent hard rock fragments and 10 to 35 percent soft, weathered rock fragments. It is 40 to 60 percent clay.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 1 or 2 when moist. It has 15 to 25 percent pebbles. Reaction is slightly acid or neutral.

The BAt horizon has hue of 10YR or 2.5Y and chroma of 2 or 3 when dry. It is clay, silty clay loam, or heavy clay loam and has 0 to 15 percent pebbles and 0 to 5 percent cobbles. Reaction is moderately acid or slightly acid.

The Bt horizon has value of 4 to 6 when moist and 5 or 6 when dry, and it has chroma of 3 or 4 when moist or dry. It averages 15 to 45 percent soft rock fragments. Reaction is moderately acid or slightly acid.

Stabbart Series

The Stabbart series consists of very deep, somewhat poorly drained soils on toe slopes and alluvial fans. These soils formed in alluvium derived dominantly from fine textured igneous rock. Slope is 0 to 3 percent. Elevation is 800 to 1,200 feet. The average annual precipitation is about 95 inches, the average annual air temperature is about 46 degrees F, and the average frost-free season is 115 to 135 days.

These soils are fine-loamy, mixed, mesic Aquic Hapludolls.

Typical pedon of Stabbart clay loam, about 2 miles south of Stabler; 1,100 feet south and 2,000 feet east of the northwest corner of sec. 35, T. 4 N., R. 7 E.

A—0 to 13 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; moderate fine granular structure and weak very fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine irregular pores; 5 percent pebbles and 10 percent concretions; strongly acid; clear smooth boundary.

BA—13 to 18 inches; dark brown (10YR 3/3) clay loam, pale brown (10YR 6/3) dry; few fine faint dark grayish brown (10YR 4/2) mottles; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots, common fine roots, and few coarse roots; common very fine irregular pores and few fine tubular pores; 5 percent concretions; strongly acid; clear wavy boundary.

Bt1—18 to 29 inches; dark brown (10YR 4/3) clay loam, pale brown (10YR 6/3) dry; few fine faint dark grayish brown (10YR 4/2) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few coarse roots; few very fine and fine irregular pores; few thin clay films on faces of peds; strongly acid; clear irregular boundary.

Bt2—29 to 37 inches; light yellowish brown (10YR 6/4) silty clay loam, white (10YR 8/2) dry; common fine distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; few moderately thick clay films on faces of peds; strongly acid; clear wavy boundary.

C—37 to 60 inches; light yellowish brown (10YR 6/4) clay loam, very pale brown (10YR 7/3) dry; common fine distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine and very fine irregular pores; strongly acid.

The mollic epipedon is mottled and is 10 to 13 inches thick. The 10- to 40-inch particle-size control section ranges from 27 to 35 percent clay. Low-chroma mottles are at a depth of 10 to 15 inches. An apparent water table is at a depth of 6 to 12 inches during January to May.

The A horizon has chroma of 2 or 3 when moist or dry. Content of concretions ranges from 5 to 10 percent.

The Bt horizon is mottled and has value of 3 to 6 when moist and 5 to 8 when dry, and it has chroma of 2 to 4 when moist or dry. It is clay loam or silty clay loam.

The C horizon has value of 4 to 6 when moist and 5 to 7 when dry, and it has chroma of 3 or 4 when moist or dry.

Stabler Series

The Stabler series consists of very deep, well drained soils on terraces and back slopes. These soils formed in pyroclastic flows of volcanic ash and pumice. Slope is 0 to 65 percent. Elevation is 600 to 1,600 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 46 degrees F, and the average frost-free season is 110 to 140 days.

These soils are medial, mesic Entic Dystrandepts.

Typical pedon of Stabler loam, 0 to 8 percent slopes, about 3 miles northwest of Stabler; 200 feet north and 1,600 feet east of the southwest corner of sec. 10, T. 4 N., R. 7 E.

O1—1 to 0.5 inch; leaves, needles, and twigs.

O2—0.5 inch to 0; decomposed organic material.

Ac1—0 to 2 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots; many fine and common medium irregular pores; 15 percent shotlike aggregrates 2 to 4 millimeters in size; moderately acid; clear wavy boundary.

Ac2—2 to 9 inches; dark yellowish brown (10YR 3/4) loam, yellowish brown (10YR 5/4) dry; weak coarse granular structure; slightly hard, very friable, slightly sticky and nonplastic; weakly smeary; many very fine and common fine roots; many fine and common medium irregular pores; 15 percent shotlike aggregates 2 to 4 millimeters in size; moderately acid; clear wavy boundary.

Bwc—9 to 26 inches; dark yellowish brown (10YR 3/6) loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; common fine and medium roots; common fine irregular pores; 10 percent shotlike aggregates 2 to 4 millimeters in size; moderately acid; clear smooth boundary.

Bw—26 to 37 inches; dark yellowish brown (10YR 4/6) loam, light yellowish brown (10YR 6/4) dry; massive; hard, firm, slightly sticky and nonplastic; weakly smeary; common fine roots; many fine irregular pores; 10 percent shotlike aggregates 2 to 4 millimeters in size; moderately acid; clear smooth boundary.

C—37 to 60 inches; dark yellowish brown (10YR 4/6) sandy loam, very pale brown (10YR 7/4) dry; massive; hard, very firm, nonsticky and nonplastic; weakly smeary; few fine roots; many fine irregular pores; slightly acid.

The solum is 30 to 50 inches thick. The 10- to 40-inch particle-size control section is 0 to 2 percent coarse fragments and 10 to 18 percent clay. Reaction is moderately acid or slightly acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 3 or 4 when dry. It is 5 to 20 percent shotlike aggregates.

The B horizon has hue of 7.5YR or 10YR, value of 3 or 4 when moist and 5 to 7 when dry, and chroma of 4 to 6 when moist or dry. It is loam or silt loam. The upper part of the horizon is 0 to 15 percent shotlike aggregates.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 7 when moist or dry, and chroma of 4 to 6 when moist. It is loam or sandy loam.

Steever Series

The Steever series consists of very deep, well drained soils on back slopes, foot slopes, and toe slopes. These soils formed in colluvial landslide material derived from basalt, andesite, and conglomerate. Slope is 2 to 65 percent. Elevation is 50 to 1,500 feet. The average annual precipitation is about 75 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is 100 to 160 days.

These soils are loamy-skeletal, mixed, mesic Typic Haplumbrepts.

Typical pedon of Steever stony clay loam, 2 to 30 percent slopes, about 2 miles west of Stevenson; 1,500 feet east and 2,000 feet south of the northwest corner of sec. 3, T. 2 N., R. 7 E.

Oi—1 inch to 0; leaves, needles, and twigs.

A—0 to 5 inches; very dark brown (10YR 2/2) stony clay loam, dark grayish brown (10YR 4/2) dry; moderate fine granular and subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium roots; many fine and medium irregular pores; 20 percent pebbles, 10 percent cobbles, and 5 percent stones; moderately acid; abrupt wavy boundary.

AB—5 to 12 inches; dark brown (10YR 3/3) gravelly clay loam, brown (10YR 5/3) dry; moderate fine granular structure and weak fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium roots; many fine and medium irregular pores; 30 percent hard pebbles, 5 percent hard cobbles, and 5 percent soft saprolitic pebbles; strongly acid; clear wavy boundary.

Bw1—12 to 20 inches; dark brown (10YR 4/3) very gravelly clay loam, yellowish brown (10YR 5/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium roots; common fine and medium irregular pores; 40 percent hard pebbles and 10 percent soft saprolitic pebbles; strongly acid; clear wavy boundary.

Bw2—20 to 30 inches; dark brown (10YR 4/3) very gravelly loam, yellowish brown (10YR 5/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few coarse roots; common fine irregular pores; 40 percent hard pebbles and 20 percent soft saprolitic pebbles; strongly acid; clear smooth boundary.

C—30 to 60 inches; dark brown (10YR 4/3) very gravelly loam, yellowish brown (10YR 5/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine irregular pores; 40 percent hard pebbles, 10 percent hard cobbles, and 40 percent soft saprolitic pebbles; strongly acid.

The umbric epipedon is 10 to 13 inches thick. The 10- to 40-inch particle-size control section is 18 to 32 percent clay and averages 35 to 60 percent rock fragments and 5 to 30 percent saprolitic fragments. Reaction is strongly acid or moderately acid throughout.

The A and AB horizons have hue of 10YR or 2.5Y, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. From 2 to 10 percent of the surface is covered with stones.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 or 5 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It is very gravelly clay loam, very gravelly loam, or very gravelly silt loam.

The C horizon has colors and textures similar to those of the B horizon.

Stevenson Series

The Stevenson series consists of very deep, well drained soils on toe slopes, foot slopes, and back slopes of mountains. These soils formed in colluvial landslide material derived from basalt, andesite, and conglomerate. Slope is 2 to 50 percent. Elevation is 100 to 1,200 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 47 degrees F, and the frost-free season is 110 to 150 days.

These soils are fine-loamy, mixed, mesic Typic Haplumbrepts.

Typical pedon of Stevenson loam, 15 to 30 percent slopes, about 3.5 miles north of Stevenson; 300 feet north and 1,750 feet west of the southeast corner of sec. 13, T. 3 N., R. 7 E.

O—1 inch to 0; needles, leaves, and twigs.

A1—0 to 4 inches; dark brown (7.5YR 3/2) loam, dark brown (7.5YR 4/4) dry; weak fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine, fine, and medium irregular pores; 5 percent concretions; moderately acid; clear wavy boundary.

A2—4 to 11 inches; dark brown (7.5YR 3/3) loam, brown (7.5YR 5/4) dry; weak medium granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium roots; many very fine, fine, and medium irregular pores; 5 percent concretions; moderately acid; clear wavy boundary.

Bw1—11 to 28 inches; dark brown (7.5YR 4/4) loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common fine and medium irregular pores; 5 percent soft saprolitic basalt fragments; strongly acid; clear wavy boundary.

Bw2—28 to 37 inches; dark yellowish brown (10YR 4/4) loam, yellowish brown (10YR 5/4) dry; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many fine and medium irregular pores and common medium tubular pores; 40 percent soft saprolitic basalt fragments; strongly acid; abrupt wavy boundary.

C—37 to 60 inches; dark yellowish brown (10YR 4/6) loam, yellowish brown (10YR 5/6) dry; massive; soft, very friable, slightly sticky and slightly plastic; few fine roots; few fine irregular pores; 50 percent soft saprolitic basalt fragments; strongly acid.

The solum is 35 to 55 inches thick. The 10- to 40-inch particle-size control section is 20 to 35 percent clay. It averages 0 to 15 percent hard rock fragments and 15 to 35 percent soft saprolitic fragments.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry, and chroma of 2 or 3 when moist and 2 to 4 when dry.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry, and chroma of 4 to 6 when moist or dry. It is clay loam, loam, or silt loam. Reaction is strongly acid or moderately acid.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 4 to 6 when moist or dry. It is clay loam or loam and is 0 to 35 percent hard rock fragments and 35 to 60 percent soft saprolitic fragments.

Studebaker Series

The Studebaker series consists of very deep, somewhat excessively drained soils on highly irregular mountain foot slopes and toe slopes. These soils formed in avalanche debris flow material. Slopes are mostly 0 to 20 percent, but there are very short slopes of as much as 100 percent. Elevation is 2,700 to 5,500 feet. The average annual precipitation is about 135 inches, the average annual air temperature is about 40 degrees F, and the frost-free season is 70 to 90 days.

These soils are sandy-skeletal, mixed Typic Cryorthents.

Typical pedon of Studebaker very gravelly loamy sand, 0 to 20 percent slopes, about 3.5 miles west of Spirit Lake, 2,000 feet south and 1,500 feet east of the northwest corner of sec. 19, T. 9 N., R. 5 E.

C1—0 to 6 inches; dark gray (10YR 4/1) very gravelly loamy sand, light gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse irregular pores; 15 percent cobbles, 40 percent pebbles, and 15 percent pumice fragments; moderately acid; clear wavy boundary.

C2—6 to 60 inches; dark gray (10YR 4/1) extremely gravelly loamy sand, gray (10YR 5/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse irregular pores; 20 percent cobbles, 45 percent pebbles, and 15 percent pumice fragments; moderately acid.

The mean annual soil temperature ranges from 38 to 43 degrees F. The 10- to 40-inch particle-size control section averages 35 to 80 percent coarse fragments and 15 to 50 percent volcanic glass and glass aggregates. It is very strongly acid to moderately acid.

The C1 horizon has hue of 2.5YR to 10YR, value of 3 to 6 when moist and 4 to 8 when dry, and chroma of 1 to 4 when moist or dry. Texture ranges from loamy sand to extremely cindery sand.

The C2 horizon has hue of 2.5YR to 10YR, value of 3 to 5 when moist and 4 to 8 when dry, and chroma of 1 to 3 when moist. It is very gravelly loamy sand, extremely gravelly loamy sand, or extremely cobbly sand. Strata that have varying amounts of gravel are common.

Swift Series

The Swift series consists of very deep, well drained soils on side slopes and ridgetops of mountains. These soils formed in colluvium derived from volcanic ash and basic igneous rock with a mantle of volcanic ash and cinders. Slope is 2 to 90 percent. Elevation is 1,200 to 2,800 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is 100 to 120 days.

These soils are ashy over medial-skeletal, frigid Typic Vitrandepts.

Typical pedon of Swift cindery sandy loam, 2 to 30 percent slopes, about 1 mile northwest of McClellan Mountain; 1,200 feet south and 400 feet west of the northeast corner of sec. 4, T. 6 N., R. 6 E.

O1—2 inches to 1 inch; leaves, needles, twigs, and moss.

O2—1 inch to 0; decomposed organic litter.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) extremely cindery sand (cinders and volcanic ash), grayish brown (10YR 5/2) dry; single grain; loose; many very fine roots and few medium roots; many medium and coarse irregular pores; 70 percent subangular pumice fragments 2 to 10 millimeters in size; moderately acid; abrupt wavy boundary.

A2—2 to 4 inches; very dark grayish brown (10YR 3/2) cindery sandy loam (volcanic ash and cinders), light brownish gray (10YR 6/2) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; common fine irregular pores; 15 percent pumice fragments 2 to 15 millimeters in size and 5 percent angular and subangular pebbles; slightly acid; clear wavy boundary.

A3—4 to 12 inches; dark brown (10YR 3/3) cindery sandy loam (volcanic ash and cinders), pale brown (10YR 6/3) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; common medium irregular pores; 15 percent pumice fragments 2 to 15 millimeters in size and 10 percent angular and subangular pebbles; slightly acid; clear wavy boundary.

Bw—12 to 27 inches; dark yellowish brown (10YR 4/4) very cindery loam (volcanic ash and cinders), very pale brown (10YR 7/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and slightly plastic; weakly smeary; many very fine and fine roots and common medium roots; many fine irregular pores; 30 percent pumice fragments 2 to 20 millimeters in size and 15 percent angular and subangular andesite pebbles; moderately acid; clear wavy boundary.

2Bwb—27 to 60 inches; dark yellowish brown (10YR 3/4) extremely cobbly loam, very pale brown (10YR 7/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots and few coarse roots; many fine and medium irregular pores; 40 percent pebbles, 25 percent cobbles, and 10 percent stones; moderately acid.

The upper part of the 10- to 40-inch particle-size control section averages 35 to 50 percent cinders, and the lower part averages 40 to 75 percent hard rock fragments.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 5 or 6 when dry, and chroma of 2 or 3 when moist or dry. It is 5 to 10 percent hard pebbles. Reaction is moderately acid or slightly acid.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 3 or 4 when moist or dry. It is very cindery loam or very cindery sandy loam. It is 25 to 35 percent pumice fragments and 10 to 20 percent hard rock fragments.

The 2Bwb horizon has hue of 10YR or 2.5Y, value of 3 to 5 when moist and 6 or 7 when dry, and chroma of 3 or 4 when moist or dry. It is very gravelly, very cobbly or extremely cobbly. The fine earth fraction is loam or clay loam. It has 20 to 40 percent hard pebbles, 15 to 25 percent coobles, and 5 to 10 percent stones.

Timberhead Series

The Timberhead series consists of very deep, well drained soils on back slopes and ridgetops of mountains. These soils formed in residuum and colluvium derived dominantly from basalt with a mantle of volcanic ash. Slope is 5 to 65 percent. Elevation is 2,000 to 2,800 feet. The average annual precipitation is about 60 inches, the average annual air temperature is 44 degrees F, and the average frost-free season is 95 to 115 days.

These soils are medial, frigid Andic Xerumbrepts.

Typical pedon of Timberhead gravelly loam, 5 to 30 percent slopes, about 2 miles east of Willard; 500 feet south and 200 feet west of the northeast corner of sec. 6, T. 3 N., R. 10 E.

O—1 inch to 0; needles, leaves, twigs, and cones.

—0 to 10 inches: dark brown (7.5YR 3/2) gravelly oam, dark brown (7.5YR 4/4) dry; weak very fine granular structure; soft, very friable, slightly sticky and nonplastic, weakly smeary; many very fine, fine, and medium roots; many very fine irregular pores; 35 percent pebbles; moderately acid; clear wavy boundary.

3—10 to 20 inches: dark brown (7.5YR 3/4) gravelly oam, strong brown (7.5YR 5/6) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium and coarse roots, many fine irregular pores and common medium tubular pores; 25 percent pebbles; moderately acid; gradual wavy boundary.

—20 to 40 inches: dark brown (7.5YR 4/4) gravelly oam, strong brown (7.5YR 5/6) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots and few coarse roots; many fine irregular pores and common medium tubular pores; 35 percent saprolitic fragments and 20 percent hard pebbles; strongly acid; clear wavy boundary.

-40 to 60 inches: dark brown (7.5YR 4/4) loam, strong brown (7.5YR 5/8) dry; massive; slightly hard, friable, slightly sticky and nonplastic; many fine and medium roots; common fine irregular pores; 60 percent saprolitic pebbles; strongly acid.

Volcanic ash influences the entire profile but is most ndant in the upper 8 to 13 inches. The 10- to 40- particle-size control section averages 20 to 35 cent hard rock fragments and is 13 to 18 percent . Reaction of the B and C horizons is moderately or strongly acid.

he A and AB horizons have hue of 7.5YR or 5YR, e of 3 or 4 when dry, and chroma of 2 or 3 when st and 3 or 4 when dry.

he Bw horizon has hue of 7.5YR or 10YR, value of 5 when dry and 3 or 4 when moist, and chroma of 6 when dry or moist.

he C horizon has chroma of 6 to 8 when dry. It has o 85 percent saprolitic fragments.

dedollar Series

he Tradedollar series consists of very deep, well ned soils on back slopes and ridgetops of ntains. These soils formed in aerially deposited anic ash and pumice. Slope is 0 to 90 percent. ation is 2,800 to 5,400 feet. The average annual precipitation is about 100 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 75 to 95 days.

These soils are cindery Typic Cryorthods.

Typical pedon of Tradedollar sandy loam, 65 to 90 percent slopes, about 2 miles west of St. Helens Lake; 400 feet north and 200 feet west of the southeast corner of sec. 32, T. 10 N., R. 5 E.

O—1 inch to 0; decomposed organic material.

A1—0 to 1 inch; very dark gray (10YR 3/1) sandy loam, gray (10YR 6/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; moderately acid; abrupt smooth boundary.

A2—1 inch to 5 inches; very dark grayish brown (10YR 3/2) sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium roots, and few coarse roots; many fine irregular pores and few fine and medium tubular pores; 10 percent pumice fragments; moderately acid; clear wavy boundary.

Bs1—5 to 15 inches; dark brown (7.5YR 4/2) cindery sandy loam, brown (7.5YR 5/3) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; many very fine and fine roots and common medium and coarse roots; many fine irregular pores and common fine and medium tubular pores; 15 percent pumice fragments; moderately acid; clear wavy boundary.

Bs2—15 to 26 inches; dark brown (7.5YR 4/2) cindery sandy loam, pinkish gray (7.5YR 6/2) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; common very fine and fine roots and few medium and coarse roots; many fine irregular pores and common medium tubular pores; 30 percent pumice fragments and 10 percent pebbles; moderately acid; clear wavy boundary.

Bs3—26 to 35 inches; dark brown (7.5YR 4/2) extremely cindery loamy sand, brown (7.5YR 5/2) dry; common medium distinct strong brown (7.5YR 5/6) stains; single grain; loose; common very fine and fine roots and few medium roots; many fine and medium irregular pores and few fine and medium tubular pores; 60 percent pumice fragments; moderately acid; clear wavy boundary.

Bs4—35 to 42 inches; strong brown (7.5YR 5/6) extremely cindery sand, reddish yellow (7.5YR 6/6) dry; single grain; loose; few medium roots; many coarse irregular pores; 75 percent pumice fragments and 15 percent cobbles; moderately acid; abrupt smooth boundary.

2Eb—42 to 51 inches; dark grayish brown (10YR 4/2) cindery sandy loam, light brownish gray (10YR 6/2) dry; massive; soft, friable, nonsticky and nonplastic; weakly smeary; common fine roots and few medium roots; many fine irregular pores and few fine tubular pores; moderately acid; gradual wavy boundary.

2Bwb—51 to 60 inches; dark brown (10YR 4/3) very gravelly sandy loam, pale brown (10YR 6/3) dry; massive; soft, friable, nonsticky and nonplastic; weakly smeary; few fine roots; many medium and coarse irregular pores; 30 percent pumice fragments and 40 percent pebbles; moderately acid.

The 10- to 40-inch particle-size control section averages 35 to 55 percent pumice fragments. Depth to the buried profile is 40 to 50 inches or more.

The A horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 2 or 5 when moist and 4 to 8 when dry, and chroma of 0 to 3 when moist or dry.

The Bs1 horizon has hue of 7.5YR or 5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 2 to 6 when moist or dry. It is 15 to 30 percent pebble-sized pumice fragments.

The Bs2 horizon has hue of 7.5YR or 5YR, value of 4 to 6 when moist and 6 to 8 when dry, and chroma of 2 to 6 when moist or dry. It is 30 to 55 percent pebble-sized pumice fragments and 0 to 15 percent hard pebbles.

The Bs3 and Bs4 horizons have hue of 7.5YR or 5YR, value of 4 to 6 when moist and 5 to 8 when dry, and chroma of 2 to 8 when moist or dry. They are 60 to 80 percent pumice fragments and 0 to 15 percent pebbles.

The 2Eb and 2Bwb horizons are 15 to 55 percent pebbles and 0 to 20 percent pumice fragments.

Underwood Series

The Underwood series consists of very deep, well drained soils on foot slopes and back slopes of mountains and benches. These soils formed in residuum and colluvium derived from basalt and andesite with a thin mantle of volcanic ash. Slope is 2 to 50 percent. Elevation is 500 to 2,000 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 46 degrees F, and the average frost-free season is 100 to 150 days.

These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Underwood loam, 30 to 50 percent slopes, about 1 mile south of Willard; 200 feet south and 1,700 feet west of the northwest corner of sec. 11, T. 3 N., R. 9 E.

O1—2 inches to 0.75 inch; needles, leaves, and twigs.

O2—0.75 inch to 0; decomposed organic material.

Ac—0 to 5 inches; dark brown (7.5YR 3/2) loam, brown (7.5YR 4/4) dry; weak coarse granular structure; soft, very friable, slightly sticky and nonplastic; weakly smeary; many fine roots and common medium roots; many coarse irregular pores; 35 percent fine shotlike aggregates 2 to 4 millimeters in size; slightly acid; clear smooth boundary.

BA—5 to 19 inches; dark brown (7.5YR 3/4) loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common fine and medium roots; many fine irregular pores and few fine tubular pores; few pebbles; moderately acid; clear smooth boundary.

Bt—19 to 35 inches; dark brown (7.5YR 3/4) clay loam, brown (7.5YR 5/4) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky and plastic; few fine, medium, and coarse roots; many fine irregular pores and few fine tubular pores; 5 percent soft pebbles; common moderately thick clay films in pores and on faces of peds; strongly acid; clear wavy boundary.

C—35 to 60 inches; dark yellowish brown (10YR 4/6) loam, brownish yellow (10YR 6/6) dry; common medium distinct mottles that are yellowish red (5YR 4/6) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common medium irregular and tubular pores; 15 percent soft pebbles; strongly acid.

Thickness of the solum is 30 to 40 inches. The upper 4 to 6 inches of the profile is dominated by volcanic ash and has 15 to 35 percent shotlike aggregates. The 19- to 35-inch particle-size control section is 25 to 35 percent clay, 5 to 25 percent soft, weathered rock fragments, and 0 to 15 percent hard pebbles and cobbles. The profile has 0 to 25 percent rock fragments below the control section.

The A and AB horizons have hue of 5YR or 7.5YR, value of 4 or 5 when dry, and chroma of 2 to 4 when moist or dry.

The Bt horizon has hue of 5YR or 7.5YR and value of 3 or 4 when moist. It is loam or clay loam. Reaction is strongly acid or moderately acid.

The C horizon has hue of 5YR, 7.5YR, or 10YR, and it has value of 4 or 5 when moist and 5 or 6 when dry. It is loam, gravelly loam, or clay loam. Reaction is strongly acid or moderately acid.

Undusk Series

The Undusk series consists of very deep, well drained soils on back slopes of mountains. These soils formed in colluvium derived from basalt with a thin mantle of volcanic ash. Slope is 5 to 65 percent. Elevation is 2,000 to 2,800 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 44 degrees F, and the average frost-free season is 90 to 120 days.

These soils are loamy-skeletal, mixed, frigid Typic Xerumbrepts.

Typical pedon of Undusk gravelly loam, 30 to 65 percent slopes, about 2.5 miles northwest of Underwood; 900 feet south and 500 feet east of the northwest corner of sec. 17, T. 3 N., R. 10 E.

0—1 inch to 0; needles, leaves, and twigs.

A1—0 to 6 inches; dark brown (7.5YR 3/3) gravelly loam, brown (7.5YR 5/4) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; common very fine and fine roots; common fine irregular pores; 20 percent pebbles and 5 percent shotlike aggregates 2 to 4 millimeters in size; neutral; clear wavy boundary.

A2—6 to 15 inches; dark brown (7.5YR 3/3) gravelly loam, strong brown (7.5YR 5/6) dry; weak coarse granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; common fine irregular pores; 20 percent pebbles; neutral; clear wavy boundary.

Bw1—15 to 24 inches; dark brown (7.5YR 4/4) very gravelly loam, strong brown (7.5YR 5/6) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots and common fine roots; common fine irregular pores; 35 percent pebbles; neutral; clear smooth boundary.

Bw2—24 to 40 inches; dark brown (7.5YR 4/4) extremely gravelly loam, light brown (7.5YR 6/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine irregular pores; 50 percent pebbles and 10 percent cobbles; slightly acid; gradual smooth boundary.

Bw3—40 to 60 inches; dark brown (7.5YR 4/4) very gravelly loam, reddish yellow (7.5YR 6/6) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine irregular pores; 45 percent pebbles and 10 percent cobbles; slightly acid.

The upper 4 to 6 inches of the profile is dominated by volcanic ash. The umbric epipedon is 10 to 15 inches thick. The 10- to 40-inch particle-size control section averages 35 to 60 percent rock fragments and has 18 to 25 percent clay. Reaction is slightly acid or neutral.

The A horizon has chroma of 2 or 3 when moist. It has 15 to 30 percent pebbles and 5 to 10 percent shotlike aggregates.

The Bw horizon has value of 4 or 5 when moist and 5 or 6 when dry, and it has chroma of 4 to 6 when moist or dry. It is 35 to 50 percent pebbles and 0 to 20 percent cobbles and stones.

Vanson Series

The Vanson series consists of deep, well drained soils on back slopes, foot slopes, and ridgetops of mountains. These soils formed in colluvium derived from igneous rock with a mantle of aerially deposited volcanic ash and pumice. Slope is 5 to 90 percent. Elevation is 2,800 to 5,000 feet. The average annual precipitation is about 105 inches, the average annual air temperature is about 39 degrees F, and the average frost-free season is 75 to 95 days.

These soils are ashy over loamy-skeletal, mixed Typic Cryorthods.

Typical pedon of Vanson sandy loam, 30 to 65 percent slopes, about 5 miles northwest of Cougar; 2,000 feet south and 2,000 feet east of the northwest corner of sec. 6, T. 7 N., R. 5 E.

E—0 to 1 inch; very dark gray (10YR 3/1) loamy sand, gray (10YR 5/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many fine irregular pores; moderately acid; abrupt wavy boundary.

Bs1—1 inch to 9 inches; dark brown (7.5YR 3/3) sandy loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; common fine roots and many medium and coarse roots; many fine irregular pores; 5 percent pebbles and 10 percent pumice fragments; moderately acid; clear wavy boundary.

2Bs2—9 to 16 inches; dark yellowish brown (10YR 3/4) sandy loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots and many medium and coarse roots; many fine and medium irregular pores; 5 percent pumice fragments; slightly acid; clear irregular boundary.

2Bs3—16 to 24 inches; dark brown (10YR 4/3) loamy sand, very pale brown (10YR 7/3) dry; many fine prominent strong brown (7.5YR 5/8) and reddish yellow (7.5YR 6/8) mottles; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots and few coarse roots; many fine and medium irregular pores; 10 percent pumice fragments; slightly acid; clear wavy boundary.

3Bs4—24 to 37 inches; dark yellowish brown (10YR 4/4) very gravelly sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; few fine, medium, and coarse roots; many fine irregular pores; 30 percent pebbles and 10 percent cobbles; slightly acid; clear wavy boundary.

3BC—37 to 45 inches; dark yellowish brown (10YR 4/4) very gravelly sandy loam, very pale brown (10YR 7/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; few fine, medium, and coarse roots; 35 percent pebbles and 15 percent cobbles; slightly acid; abrupt irregular boundary.

4R—45 inches; fractured andesite.

Depth to bedrock is 40 to 60 inches. The lower part of the 10- to 40-inch particle-size control section is 35 to 70 percent rock fragments. Reaction is moderately acid or slightly acid throughout the profile.

The E horizon has value of 3 or 4 when moist and 5 to 7 when dry. It has chroma of 1 or 2 when moist or dry.

The 2Bs horizon has hue of 7.5YR or 10YR, value of 3 or 4 when moist and 5 to 7 when dry, and chroma of 3 or 4 when moist or dry. It is sandy loam or loamy sand.

The 3Bs and 3BC horizons have value of 4 or 5 when moist and 6 or 7 when dry, and they have chroma of 4 or 5 when moist or dry. They are sandy loam or loam and have 30 to 50 percent pebbles and 10 to 20 percent cobbles and stones.

Wakepish Series

The Wakepish series consists of very deep, somewhat excessively drained soils on fans and low terraces and along drainageways. These soils formed in mudflow material. Slopes are 0 to 30 percent. Elevation is 1,600 to 2,800. The average annual precipitation is about 135 inches, the average annual air temperature is about 42 degrees F, and the average frost-free season is 90 to 110 days.

These soils are sandy-skeletal, mixed, frigid Typic Udorthents.

Typical pedon of Wakepish very gravelly sandy loam, 0 to 30 percent slopes, about 5 miles east of Mount St. Helens, on Smith Creek; 2,600 feet south and 500 feet west of the northeast corner of sec. 5, T. 8 N., R. 6 E.

C1—0 to 30 inches; dark gray (10YR 4/1) very gravelly sandy loam, light gray (10YR 7/1) dry; single grain; loose, nonsticky and nonplastic; many fine, medium, and coarse irregular pores; 15 percent cobbles, 35 percent pebbles, and 20 percent pumice fragments; moderately acid; clear smooth boundary.

C2—30 to 60 inches; dark gray (10YR 4/1) very gravelly loamy sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse irregular pores; 20 percent cobbles and 45 percent pebbles; strongly acid.

The mean annual soil temperature ranges from 43 to 47 degrees F. The particle-size control section averages 15 to 50 percent volcanic glass and glass aggregates and is 35 to 50 percent coarse fragments. It is very strongly acid to moderately acid. Some profiles contain woody organic debris that consists of logs, branches, and bark.

The C1 horizon has hue of 7.5YR to 2.5Y, value of 3 to 6 when moist and 4 to 8 when dry, and chroma of 0 to 3 when moist or dry. In some areas the surface is stony or bouldery. Some areas have a cindery surface layer.

The C2 horizon has hue of 7.5YR to 2.5Y, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 0 to 3 when moist or dry. It is very gravelly loamy sand or very gravelly sand.

Washougal Series

The Washougal series consists of very deep, well drained soils on terraces and terrace escarpments. These soils formed in mixed alluvial ash, basalt, and andesite. Slope is 0 to 50 percent. Elevation is 50 to 800 feet. The average annual precipitation is about 60 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is 120 to 180 days.

These soils are medial-skeletal, mesic Andic Xerumbrepts.

Typical pedon of Washougal loam, 0 to 3 percent slopes, about 600 feet northeast of the steel bridge on

Shields Skye Road; 900 feet north and 300 feet west of he southeast corner of sec. 31, T. 2 N., R. 5 E.

O—1 inch to 0; leaves, needles, twigs, and grasses.

A1—0 to 5 inches; black (10YR 2/1) loam, very dark grayish brown (10YR 3/2) dry; moderate very fine and medium granular structure; soft, very friable, nonsticky and slightly plastic; weakly smeary; many fine roots; many fine irregular pores; very strongly acid; clear smooth boundary.

2—5 to 14 inches; black (10YR 2/1) gravelly loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; common fine roots; common very fine and fine irregular pores; 20 percent pebbles; strongly acid; gradual smooth boundary.

3—14 to 22 inches; very dark brown (10YR 2/2) gravelly loam, dark grayish brown (10YR 4/2) dry; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; weakly smeary; common very fine roots; common medium irregular pores; 20 percent pebbles; strongly acid; abrupt irregular boundary.

C—22 to 30 inches; dark brown (7.5YR 3/2) very gravelly loam, brown (7.5YR 4/2) dry; massive; soft, friable, nonsticky and nonplastic; common very fine roots and few medium roots; many fine and medium irregular pores and few fine tubular pores; 35 percent pebbles and 15 percent cobbles; strongly acid; abrupt irregular boundary.

1—30 to 36 inches; dark brown (10YR 4/3) very gravelly coarse sandy loam, brown (10YR 5/3) dry; single grain; loose; few very fine roots; common medium and coarse irregular pores; 40 percent pebbles and 20 percent cobbles; intermittent weak silica and manganese cementation; strongly acid; abrupt irregular boundary.

C2—36 to 60 inches; dark brown (7.5YR 3/3) extremely cobbly coarse sand, brown (7.5YR 5/3) dry; single grain; loose; many medium and coarse irregular pores; 35 percent pebbles, 20 percent cobbles, and 10 percent stones; strongly acid.

Depth to the 2C horizon ranges from 30 to 60 inches. e umbric epipedon is 20 to 30 inches thick.

The A and AC horizons have hue of 10YR or 7.5YR, ue of 2 or 3 when moist and 3 or 4 when dry, and roma of 1 to 3 when moist or dry. The A horizon has o 30 percent rock fragments, and the AC horizon has to 60 percent.

The C horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 4 to 6 when dry, and chroma of 2 to 4 when moist or dry. It is very gravelly coarse sandy loam, very cobbly coarse sandy loam, extremely cobbly coarse sandy loam, or very gravelly loam.

The 2C horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 4 to 6 when dry, and chroma of 2 to 4 when moist or dry. It has 20 to 50 percent pebbles, 15 to 25 percent cobbles, and 0 to 10 percent stones. The fine earth fraction is sand, loamy sand, or coarse sand.

Yalelake Series

The Yalelake series consists of very deep, well drained soils on terraces and terrace escarpments. These soils formed in volcanic ash and pumice over pyroclastic deposits. Slope is 2 to 90 percent. Elevation is 800 to 1,800 feet. The average annual precipitation is about 120 inches, the average annual air temperature is about 50 degrees F, and the average frost-free season is 100 to 135 days.

These soils are ashy over medial, mesic Umbric Vitrandepts.

Typical pedon of Yalelake sandy loam, 2 to 30 percent slopes, south of Forest Service Road N90, about 1 mile northeast of Swift Creek Dam; 2,600 feet south and 250 feet east of the northwest corner of sec. 22, T. 7 N., R. 5 E.

O1—2 inches to 0.5 inch; needles, leaves, and twigs.

O2—0.5 inch to 0; decomposed organic material.

A—0 to 4 inches; very dark brown (10YR 2/2) sandy loam (volcanic ash), dark grayish brown (10YR 4/2) dry; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and common fine and medium roots; many very fine irregular pores; slightly acid; clear wavy boundary.

AB—4 to 11 inches; dark brown (10YR 3/3) sandy loam (volcanic ash), brown (10YR 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few coarse roots; many fine irregular pores; 5 percent pebbles; slightly acid; clear wavy boundary.

Bw1—11 to 20 inches; dark grayish brown (10YR 4/2) gravelly loamy sand (volcanic ash), very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots and common fine and medium roots; many fine irregular pores; 30 percent pebbles; neutral; clear wavy boundary.

2Bw2—20 to 39 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; weakly smeary; common very fine and fine roots and few medium and coarse roots; many fine and medium pores; 15 percent pebbles and 5 percent cobbles; neutral; abrupt wavy boundary.

2C1—39 to 44 inches; brownish yellow (10YR 6/8) sand, yellow (10YR 7/6) dry; single grain; loose; weakly smeary; few fine roots; many medium pores; 10 percent pebbles and 40 percent weathered pumice fragments; neutral; abrupt wavy boundary.

2C2—44 to 60 inches; dark yellowish brown (10YR 4/4) gravelly loam, light yellowish brown (10YR 6/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; few fine and medium roots; common fine irregular pores; 20 percent pebbles; neutral.

Thickness of the solum ranges from 35 to 45 inches. The ashy mantle is 17 to 25 inches thick and contains more than 60 percent volcanic ash and pumice. The 10- to 40-inch particle-size control section averages 10 to 30 percent rock fragments. The umbric epipedon is 10 to 13 inches thick.

The Bw horizon has value of 3 or 4 when moist and 5 to 7 when dry, and it has chroma of 2 to 4 when moist or dry. It is gravelly loamy sand or gravelly sandy loam. Reaction is slightly acid or neutral.

The 2Bw horizon has value of 4 or 5 when moist and 6 or 7 when dry, and it has chroma of 4 to 8 when moist or dry. It is sandy loam, loam, or gravelly sandy loam. Reaction is slightly acid or neutral.

The 2C horizon has value of 4 to 6 when moist and 6 or 7 when dry, and it has chroma of 4 to 8 when moist or dry. It is sandy loam or loam with thin strata of loamy sand or sand. The horizon has 10 to 25 percent pebbles and 15 to 40 percent soft, weathered pumice fragments. Reaction is slightly acid or neutral.

Zygore Series

The Zygore series consists of very deep, well drained soils on foot slopes, back slopes, and shoulders of mountains. These soils formed in colluvium derived dominantly from basalt and andesite mixed with volcanic ash. Slope is 5 to 65 percent. Elevation is 2,000 to 3,000 feet. The average annual precipitation is about 90 inches, the average annual air temperature is 43 degrees F, and the average frost-free season is 90 to 110 days.

These soils are medial-skeletal, frigid Andic Haplumbrepts.

Typical pedon of Zygore gravelly loam, 30 to 65 percent slopes, about 5 miles northwest of Stevenson; 1,000 feet south and 2,000 feet east of the northwest corner of sec. 10, T. 3 N., R. 7 E.

O—1 inch to 0; needles, twigs, and cones.

A—0 to 8 inches; very dark brown (10YR 2/2) gravelly loam, dark brown (10YR 4/3) dry; moderate fine granular structure and moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; many fine roots and common medium roots; many fine irregular pores; 15 percent pebbles; strongly acid; clear smooth boundary.

AB—8 to 14 inches; very dark grayish brown (10YR 3/2) gravelly loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; weakly smeary; common fine roots and few medium roots; common fine irregular pores; 20 percent pebbles and 5 percent cobbles; moderately acid; clear smooth boundary.

Bw—14 to 26 inches; dark brown (10YR 3/3) very gravelly loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; few fine irregular pores; 30 percent pebbles and 10 percent cobbles; strongly acid; gradual smooth boundary.

BC—26 to 37 inches; dark yellowish brown (10YR 3/4) very gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; few fine irregular pores; 40 percent pebbles and 10 percent cobbles; strongly acid; gradual smooth boundary.

C—37 to 60 inches; dark yellowish brown (10YR 3/4) extremely gravelly silt loam, light yellowish brown (10YR 6/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine irregular pores; 50 percent pebbles and 20 percent cobbles; very strongly acid.

The umbric epipedon is 12 to 18 inches thick and is influenced by volcanic ash.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It has 15 to 20 percent pebbles and 5 to 10 percent cobbles.

The Bw and BC horizons have hue of 10YR or

7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. The horizons are very gravelly loam or very gravelly silt loam. They have 35 to 40 percent pebbles and 5 to 10 percent cobbles.

The C horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It is very gravelly loam, extremely gravelly silt loam, or very cobbly loam.

Zymer Series

The Zymer series consists of very deep, well drained soils on mountain slopes. These soils formed in colluvium derived from volcanic ash and basic igneous rock with a mantle of volcanic ash. Slope is 2 to 90 percent. Elevation is 800 to 1,600 feet. The average annual precipitation is about 115 inches, the average annual air temperature is about 49 degrees F, and the average frost-free season is 110 to 130 days.

These soils are ashy over loamy-skeletal, mesic Umbric Vitrandepts.

Typical pedon of Zymer sandy loam, 30 to 65 percent slopes, about 2 miles southeast of Cougar; 600 feet north and 100 feet east of the southwest corner of sec. 31, T. 7 N., R. 5 E.

0—3 inches to 0; leaves, needles, twigs, and moss.

A1—0 to 4 inches; dark brown (10YR 3/3) sandy loam (volcanic ash and cinders), dark brown (10YR 4/3) dry; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; 10 percent pumice fragments and 5 percent pebbles; moderately acid; clear wavy boundary.

A2—4 to 10 inches; dark brown (10YR 3/3) loamy sand (volcanic ash and cinders), brown (10YR 5/3) dry; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; 10 percent pumice fragments and 5 percent pebbles; moderately acid; clear wavy boundary.

Bw—10 to 22 inches; dark yellowish brown (10YR 4/4) cindery loamy sand (volcanic ash and cinders), very pale brown (10YR 7/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and slightly plastic; weakly smeary; common very fine and fine roots and few medium roots; many fine irregular pores; 15 percent pumice fragments and 5 percent pebbles; strongly acid; clear wavy boundary.

BC—22 to 28 inches; dark yellowish brown (10YR 4/6) very gravelly loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and slightly plastic; weakly smeary; common very fine and fine roots; many fine irregular pores; 5 percent pumice fragments and 40 percent pebbles; strongly acid; abrupt wavy boundary.

2C1—28 to 47 inches; yellowish brown (10YR 5/6) extremely gravelly loam, very pale brown (10YR 7/4) dry; massive; soft, friable, nonsticky and slightly plastic; weakly smeary; few very fine roots; common fine irregular pores; 50 percent pebbles, 15 percent cobbles, and 5 percent stones; strongly acid; clear wavy boundary.

2C2—47 to 60 inches; dark yellowish brown (10YR 4/6) extremely gravelly loam, very pale brown (10YR 7/4) dry; massive; soft, friable, nonsticky and slightly plastic; weakly smeary; common fine irregular pores; 65 percent pebbles and 10 percent cobbles; strongly acid.

The umbric epipedon is 10 to 14 inches thick. The ashy mantle is 16 to 30 inches thick. The upper part of the 10- to 40-inch particle-size control section is 5 to 25 percent pumice fragments and 0 to 10 percent pebbles, and the lower part is 35 to 80 percent rock fragments.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 3 or 4 when moist or dry.

The 2BC horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 4 to 6 when moist or dry. It is 35 to 50 percent pebbles.

The 2C horizon has hue of 10YR or 2.5Y, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 4 to 6 when moist or dry. It is loam or clay loam. It is 40 to 65 percent pebbles, 0 to 15 percent cobbles, and 0 to 5 percent stones.

Zynbar Series

The Zynbar series consists of very deep, well drained soils on foot slopes and terraces. These soils formed in volcanic ash and colluvium derived from basic igneous rock over glacial drift. Slopes are 8 to 30 percent. Elevation is 1,800 to 2,400 feet. The average annual precipitation is about 80 inches, the average annual air temperature is about 44 degrees F, and the average frost-free season is 100 to 160 days.

These soils are medial, frigid Entic Dystrandepts.

Typical pedon of Zynbar gravelly silt loam, till substratum, 8 to 30 percent slopes, about 2 miles north of Tradedollar Lake; 2,700 feet west of the northeast corner of sec. 6, T. 10 N., R. 5 E.

O—2 inches to 0; partially decomposed organic litter.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, brown (10YR 5/3) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; weakly smeary; common very fine and fine roots and few medium and coarse roots; many fine irregular pores; 15 percent pebbles; moderately acid; clear wavy boundary.

Bw1—6 to 17 inches; dark brown (7.5YR 4/4) silt loam, light brown (7.5YR 6/4) dry; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; weakly smeary; common very fine and fine roots and few medium roots; many fine irregular pores; 5 percent pebbles; moderately acid; clear irregular boundary.

Bw2—17 to 31 inches; yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 7/4) dry; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; weakly smeary; few fine roots; common fine irregular pores; 10 percent soft pumice fragments; moderately acid; clear wavy boundary.

Bw3—31 to 47 inches; yellowish brown (10YR 5/6) silt loam, brownish yellow (10YR 6/6) dry; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; weakly smeary; few fine roots; common fine irregular pores; slightly acid; clear irregular boundary.

2C1—47 to 57 inches; dark yellowish brown (10YR 4/4) extremely stony silt loam, light yellowish brown (10YR 6/4) dry; massive; soft, friable, slightly sticky and nonplastic; weakly smeary; few fine roots; few fine irregular pores; 25 percent pebbles, 10 percent cobbles, and 30 percent stones; moderately acid; abrupt wavy boundary.

2C2—57 to 60 inches; gray (10YR 5/1) very gravelly loam, light gray (10YR 7/1) dry; massive; slightly hard, firm, nonsticky and nonplastic; 40 percent pebbles and 20 percent cobbles; moderately acid.

The A and B horizons are moderately acid or slightly acid. Depth to the glacial till ranges from 40 to 60 inches or more. The 10- to 40-inch particle-size control section is 0 to 15 percent rock fragments, and the 2C horizon is 50 to 80 percent.

The A horizon has value of 2 or 3 when moist and 4 to 6 when dry, and it has chroma of 2 to 4 when moist or dry.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 4 to 6 when moist or dry. It is 0 to 15 percent pumice fragments and 0 to 10 percent hard rock fragments.

The 2C horizon has value of 4 or 5 when moist and 6 or 7 when dry, and it has chroma of 1 to 4 when moist or dry. It is gravelly silt loam, very gravelly loam, or extremely stony silt loam. The horizon is 20 to 40 percent pebbles, 10 to 15 percent cobbles, and 25 to 30 percent stones.

Formation of the Soils

Soil is a natural, three-dimensional body on the Earth's surface. Its characteristics and properties have been determined by physical and chemical processes that result from the interaction of five factors: Parent material, climate, living organisms, topography, and time. The influence of any one of these factors varies from place to place, but the interaction of all the factors determines the kind of soil that forms. Soils in the survey area display a wide variety of diagnostic features and horizons that relate directly to the unique set of soil forming factors that characterize this area. In this section, the soil forming factors are described and their influences are explained and illustrated.

Parent Material

Parent material can be identified by its geologic origin and mineral composition. Soils that have developed in the survey area are derived from three basic types of parent material—flow rock of basalt and andesite, volcanic tephra deposits of ash and pumice, and transported material including alluvium, mudflow, lahar, landslide debris, and glacial drift *(22)*.

The oldest deposits in the area were laid down during the Eocene period (40 to 55 million years ago). Vast amounts of pyroclastic debris, mostly andesitic and dacitic in composition, were deposited by volcanoes to form the Ohanapecosh Formation. These volcanic deposits accumulated to a thickness of more than 10,000 feet. When volcanic activity ceased, gentle warping and faulting uplifted much of the area to form low, rolling hills. During early Miocene time (7 to 27 million years ago) Eagle Creek conglomerates of andesitic detritus and sand were deposited by swiftly running streams that poured into what may have been a broad, nearly level valley or basin. A period of uplifting and erosion followed until late Miocene time, when Yakima Basalt flows flooded the eroded surface. A few volcanoes erupted through the Yakima Basalt, leaving small stocks, plugs (such as Wind Mountain and Beacon Rock), and dikes (such as the granodiorite near Silver Star Mountain). Extensive uplift and erosion took place before the beginning of the Pleistocene Epoch. This left remnants of Yakima Basalt on the tops of mountains such as Table Mountain, Dog Mountain, and Underwood Mountain, and it exposed some of the oldest rock formations in the Cascade Range from the Ohanapecosh Formation. The rock of the Yakima Basalt formations is the source of the parent material for the soils in the McElroy-Underwood-Undusk general soil map unit, while rock from the Ohanapecosh Formation is the parent material for most of the soils in the Zygore-Aschoff-Swift general soil map unit.

Quaternary volcanism has been limited to the extrusion of basalt flows from at least ten different vents. The composition of the lava can be grouped into olivine, platy olivine, and low-alumina basalt. These include flows from Red Mountain, Bobs Mountain, Trout Creek Hill, and the Big Lava Bed north of Willard. Volcanic ash and pumice from these eruptions has accumulated on terraces in the Wind River Valley and around the base of Underwood Mountain. The Stabler and Chemawa soils are examples.

Mount St. Helens, a volcano of late Quaternary age, is near the west margin of the Cascade Range in the survey area. The cone consists of lava flows of olivine basalt and pyroxene andesite, which surround a summit plug of dacite. Around the mountain, the landscape is covered with tephra deposits of dacitic pumice and volcanic ash. The pumice and ash are the parent material for most of the soils in the Vanson-Sinnice-Tradedollar general soil map unit.

Areas of valley fill adjacent to the volcano include pyroclastic flows, lahar, and alluvium, which are interbedded with tephra and glacial drift. Shoestring, Forsyth, Polepatch, and St. Helens soils are examples of soils that formed in these materials.

During the latter part of the Pleistocene period, floods from the Columbia Basin carried silty material down the Columbia River channel. When water backed up into side drainageways, the silty material was allowed to settle out as lacustrine deposits. The Hood soils are an example of soils that formed in this parent material.

Local landslides, some occurring as recently as 200 years ago, are present in several areas along the Columbia River. The large Bonneville slide, between North Bonneville and Stevenson, covers many square miles. It is composed primarily of Eagle Creek Formation and Yakima Basalt. The headwall from this landslide, which can be seen above the town of Stevenson, is called the Red Bluffs. The Columbia River was blocked for a period of time when this slide occurred. The Steever soils developed in this material. Another landslide, between Wind Mountain and Dog Mountain, is composed chiefly of material of the Ohanapecosh Formation. This landslide is still active, and it moves 5 to 10 feet a year at the top of the slide. St. Martin gravelly silty clay loam, slumped, 2 to 30 percent slopes, is an example of a soil that developed in this material.

Climate

The climate in the survey area has an important overall influence on the characteristics of the soils. Temperature and precipitation affect the weathering rate of parent material and the chemical and physical changes that result in the formation of soils. They also affect the rate at which organic matter decomposes and influence the kind and abundance of plant growth.

The climate in the survey area varies greatly because of the influence of the Cascade Range. Winds along the Columbia River Gorge blow alternately from east and west. Winds blowing from the Pacific Ocean are mild and moist in winter and are cool and dry in summer, which has a tempering effect on the climate. Winds that are cold and dry in winter and hot and dry in summer come from the intermountain region and are responsible for extreme changes in the weather.

Rainfall generally increases with the elevation west of the Cascade Range, and it decreases rapidly as distance east of the Cascade crest increases. Along the Columbia River, rainfall ranges from 50 inches in the southwestern part of the survey area to more than 75 inches near the crest of the Cascade Range. East of the crest, rainfall decreases rapidly to about 35 inches in the southeast corner of the survey area. In the northern part of the area, precipitation ranges from 110 inches along the Lewis River to more than 140 inches at the top of Mount St. Helens. Most of the precipitation is received between October and April in the form of rain or snow. Very little rain falls in summer.

In the survey area there are three major climatic areas that greatly influence soil genesis: Areas that are warm and dry; areas that are cool and moist; and areas that are cold and wet.

At low elevations, where the average annual precipitation is less than 70 inches, evapotranspiration exceeds precipitation during the growing season. This has resulted in the formation of soils that have a xeric moisture regime, which are dry in the upper part of the profile for 45 days or more following the summer solstice. On young surfaces, the accumulation of organic matter and limited leaching of bases have helped to develop soils classified as Xerolls. The McDoug soils are an example. On older surfaces, where soil-forming factors have been active for longer periods of time, soils classified as Xeralfs have developed. Hood and Underwood soils are examples. These soils are sufficiently dry in summer for translocated clay to precipitate, orient, and accumulate on soil peds to form an argillic horizon.

At slightly higher elevations, the soil temperatures are cooler and the soils have an udic moisture regime. The average annual precipitation is more than 70 inches, which is sufficient to keep the soils moist in the upper part of the profile except for periods of less than 45 days. This condition facilitates almost continuous leaching. As a result, these soils are leached of weathered clay and have low base saturation. The accumulation of organic matter has been sufficient for the development of soils classified as Umbrepts and Andepts. The Aschoff, Cinnamon, Dougan, and Zygore soils are examples.

At very high elevations, where the average annual precipitation is more than 120 inches, the soils are very cold most of the year. The vegetation is mainly subalpine fir, Pacific silver fir, and western hemlock. At these elevations the soils develop very slowly. Cold temperatures suspend biological and chemical activity; however, some physical weathering takes place as the result of freezing and thawing. The cold temperatures and tremendous volume of precipitation result in the accumulation of large amounts of organic matter and the translocation of organic matter and sesquioxides. This material is deposited as coatings on soil particles and forms spodic horizons necessary in the development of soils classified as Cryorthods. The Lonestar and Tradedollar soils are examples.

Living Organisms

Living organisms are important in the formation of soils. Micro-organisms, plants, and animals, especially man, contribute to soil development. The nature of the changes they bring about depends on the life processes peculiar to each kind of organism. When newly developed soils receive adequate moisture and temperature, they are invaded by bacteria and fungi. These micro-organisms convert nutrients from the soil, air, and water to organic residue, which over a long period of time contributes to soil fertility. As the fertility increases, grasses, shrubs, and trees become established. In time, the soil is capable of supporting many types of vegetation. In turn, plants and the residue they produce provide an environment in which animals can thrive.

Bacteria are present in the soil in vast numbers, especially in the surface layer, where moisture, temperature, and aeration are most favorable. They help to complete important enzymatic functions in soils and aid in the decomposition of organic material. Mold and fungi are also important in the development of soil. Mold is most active in the formation of humus and in the development of soil aggregates. Fungi break down organic residue and make nutrients available to plants. Micro-organisms called actinomycetes convert nitrogen from the soil and air to plant nutrients. The decay of organic material also produces organic acids that weather minerals.

Large plants are established as the fertility of the soil increases. Roots penetrate the soil, contribute to the development of soil structure, and improve porosity. When roots decay, especially the fine roots of grasses, they provide considerable organic matter to the soil. The accumulation of organic matter in the surface layer is indicated by the presence of black or very dark brown colors. Plants also protect the soil from erosion. Leaves, needles, and twigs reduce the impact of raindrops, and organic litter holds raindrops where they fall, thus reducing runoff and erosion.

In this survey area the soils formed under three major types of plant cover. In the xeric soil zone, grass was a prominent member of the plant community, along with a mixed conifer and deciduous forest of Oregon white oak, bigleaf maple, ponderosa pine, and Douglas fir. The annual dieback of roots provides large amounts of organic material. The deciduous trees absorb calcium and other bases and return them to the soil annually, thus reducing the effects of leaching. Under these conditions soils classified as Haploxerolls and Xerumbrepts are developed. Chemawa, McDoug, McElroy, and Skamania soils are examples.

In the udic soil zone, the proportion of grasses and deciduous trees decreased and the proportion of conifers increased. Organic matter accumulated; however, bases were adsorbed by the conifers and not returned to the soil so readily as in the xeric zone. The greater precipitation in the udic soil zone has resulted in more leaching of bases. These soils are classified as Haplumbrepts. Aschoff, Skoly, and Zygore soils are examples.

At higher elevations, mainly in places where precipitation exceeds 120 inches annually, the plant communities are dominantly conifers such as western hemlock, subalpine fir, and noble fir. In these areas the presence of large amounts of organic matter and leaching of bases have produced a high hydrogen ion concentration and resulted in the formation of a spodic horizon in soils classified as Cryorthods. Lonestar, Shoestring, and Tradedollar soils are examples.

Animals, particularly rodents, earthworms, and ants, contribute to the development of soils by helping organic matter to decompose. They mix the soil, which works organic residue deeper into the profile and moves unweathered soil material to the surface, where it can be leached of nutrients. Their actions increase the development of soil structure and improve aeration. Windthrow on forest soils also aids in the churning and mixing of organic matter into the surface layer.

In this survey area conditions generally are favorable for most organisms to function, but most of the activity is in the mesic soil zone. Small animals such as gophers and moles are common in the lower lying, warmer areas. The Hesson, Mossyrock, Skamania, and Skelida soils are examples.

Man has affected soil development through timber harvest and agricultural activities. Logging operations mix the duff into the surface layer and produce soils that have a thicker, darker colored surface layer than is present in undisturbed areas. Soils are compacted, displaced, and puddled by operation of logging equipment, which alters the structure, porosity, and permeability of the soil. In addition, man has constructed roads and landings, which alters normal drainage patterns and accelerates erosion.

Some of the soils in the survey area have been cultivated for more than 75 years. The major cultivated soils are on terraces and flood plains near waterways and populated areas. The Hesson, Mossyrock, Skamania, and Skelida soils are examples. The introduction of new plants, the addition of organic matter, such as cover crops and manure, and the application of lime and fertilizer have changed the development of these soils. Cultivated soils have developed a soft, dark-colored, very friable surface layer that is high in fertility. Soil aeration, color, and texture also have been altered by artificial drainage. Man's activities, however, have not always been beneficial. Tillage can result in formation of a tillage pan that will alter drainage, permeability, and the amount of runoff. Cultivation of steeper, unprotected slopes has also accelerated erosion.

Topography

The influence of topography on soil development can be expressed by its effect on drainage, runoff, and erosion. Aspect and type of landform also impact soil development.

Water runs off the surface rapidly on well drained, steeply sloping Hatchet, Timberhead, and Skoly soils. This allows less water to enter the profile, and as a result profiles are not well developed. On well drained, moderately sloping Mountzion and Underwood soils, more water percolates through the profile. This increased water weathers and moves clay and organic residue from the A horizon and redeposits it in the B horizon. Soils on nearly level terraces and toe slopes receive large amounts of runoff from the surrounding hillsides. These somewhat poorly drained and moderately well drained soils exhibit greater development, as is indicated by the movement of clay and the development of soil structure. Stabbart and St. Martin soils are examples. Development of bottom land soils is dependent on the length and incidence of seasonal flooding and on the ability of the soil to let excess water drain away. Somewhat excessively drained Pilchuck soils are subject only to occasional flooding and are not seriously affected. Minor flooding can be a benefit by adding nutrients to the soil. Soils classified as Histic Cryaquepts are poorly drained and formed in depressional areas. They are subject to frequent flooding and are waterlogged much of the year. They receive little air for biological activity, resulting in slow soil development. Vegetation on these soils includes rushes and sedges that accumulate as layers of muck and peat.

Erosion of soil particles is related to the relief of the area. This movement of soil material results from water runoff, soil creep, and mass wasting. Generally, as slope increases, runoff becomes more rapid. Rapidly moving water detaches soil particles and transports them downslope and redeposits them on foot slopes, toe slopes, or alluvial fans. Consequently, many of the soils on ridgetops and steep mountainsides are shallow to bedrock or are intermingled with areas of Rock outcrop. Soils on steep slopes are subject to soil creep, which is the slow movement of soil downslope by gravity. Soil creep prevents colluvial soils from developing clay films in the B horizon and from weathering as rapidly as other soils in the area. Kinney and Skoly soils are examples.

Mass wasting of soils along the Columbia River is common. Weak layers in the geologic formation and saturated conditions have caused development of unstable landforms. These areas slide downslope as a unit, mixing and churning the soil as it moves. Soil development is often interrupted by periods of movement. St. Martin and Steever soils are examples of soils that developed under conditions of mass wasting.

As time passes and organic material is added to the profile, an A horizon develops. The resulting profile may be expressed as an A horizon over an undeveloped C horizon. Examples of young alluvial soils are those of the Bonneville, Pilchuck, and Washougal series. Examples of recent volcanic soils are those of the Obscurity and Polepatch series. These soils are all weakly developed in coarse textured parent material that exhibits little or no weathering of minerals; however, sufficient time has passed for the accumulation of organic material in the surface layer. These soils are classified as Entic Xerumbrepts, Xeropsamments, or Cryorthents.

In soils that have a more strongly developed profile, a sufficient amount of time has passed for minerals to have weathered. These soils are characterized as having A, B, and C horizons. Many of the soils in the survey area have this sequence of horizons. The degree to which these horizons are developed is an expression of their age. These soils are classified as Dystrandepts. The Stabler soils are an example. Soils classified as Haplumbrepts exhibit structural development in the B horizon. The Steever soils are an example of soils that show no evidence of translocated clay; however, the older Hesson, Mountzion, and Underwood soils do show evidence of translocated clay. These soils are classified as Haplohumults or Haploxeralfs and have well developed argillic horizons.

In the northern part of the survey area, depth of volcanic deposits from Mount St. Helens is directly related to aspect and distance from the source. The thickness and distribution of these deposits were greatly affected by the velocity and direction of the wind at the time of the eruption; for example, the T ash and pumice deposit occurred in a long thin band extending northeast from Mount St. Helens. This indicates that at the time of the eruption a strong wind was blowing from the southwest. In contrast, the Set W pumice is a thick deposit extending north to east from the mountain, indicating that more moderate winds were blowing from a number of different directions. Consequently, the sequence in which these layers occur in the profile depends largely on the geographic relationship and distance from the mountain.

The predominant winds blow to the northeast, so the thickest deposits occur in that direction; in addition, slopes that face toward the volcano tend to have deeper deposits. Also, the depth of the tephra depends on the steepness of the slope on which it fell. Steeply sloping areas have been subject to more erosion from water runoff and from dry ravel of pumice fragments than have less sloping areas.

Sinnice and Tradedollar are examples of soils composed almost entirely of tephra deposits from one event. Bandid, Colter, and Pelee soils are examples of soils composed of deposits from many events and thus are stratified. Other soils, such as the Swift and Vanson soils, are further away to the south and west. These soils formed in a mantle of volcanic ash and pumice over colluvium derived from basalt and andesite.

In addition to the tephra deposits, Mount St. Helens has filled the surrounding valleys with lahar, pyroclastic flow, and avalanche debris. These deposits commonly are several hundred feet thick and are composed of coarse sand and gravel. The soils that formed in these deposits are classified as Udorthents and Cryorthents. Forsyth and Polepatch soils are examples. Thin tephra deposits cover this material in some areas. The soils in these areas are classified as Vitrandepts. The St. Helens soils are an example.

Time

In this survey area there is a wide range in time during which soil development has taken place. The parent material ranges in age from that of the Eocene period (40 to 55 million years old) to the recent tephra deposits from the latest eruption of Mount St. Helens.

The time required for the formation of a soil depends largely on the interaction of the other soil-forming factors—parent material, climate, topography, and living organisms. The influence of time commonly is expressed by the degree of horizon development.

Parent material in time weathers to form layers or soil horizons. These horizons develop properties that reflect the extent of the rooting of plants, the downward movement of water, and the temperature of the soil. As time passes, these horizons become more developed and produce layers that extend deeper into the soil profile. Very young soils, therefore, have no identifiable horizons or have only thin, weakly expressed horizons. Recent volcanic soils, such as the Obscurity and Studebaker soils, and very young alluvial soils, such as the Wakepish soils, do not exhibit soil development. These soils are described as having an unweathered C horizon. They are classified as Udorthents or Cryorthents.

In the northern part of the survey area, Mount St. Helens has been an intermittent but abundant source of volcanic material for more than 35,000 years. The sequence of these deposits provides an excellent record of the mountain's eruptive history. These deposits were useful marker beds for stratographic correlation and were used to determine the age of many of the soils.

The most readily identifiable layers of tephra around the mountain are: (1) Set Y pumice, from numerous eruptions that took place 3,200 to 3,500 years ago; (2) Subset B ash and pumice, from numerous eruptions that took place 420 to 3,200 years ago; (3) Set W pumice, deposited 400 to 420 years ago; (4) T ash and pumice, deposited about 180 years ago *(26)*; and (5) ash and pumice from the May 1980 eruption. Tephra deposits older than 3,500 years occur, but in most areas the more recent deposits extend to a depth of 60 inches or more.

The different tephra deposits can be identified not only by their stratographic location in the profile but also by their color and degree of weathering. Pumice fragments in the Sinnice soils are present in thick bands of Layer W pumice with a thin layer of T ash and pumice. These deposits are less than 420 years old. The pumice fragments are "hard," and are single grain or loose. When a fragment is broken, the interior is white or nearly white, indicating that little or no weathering has occurred. In the Benham and Colter soils the Layer T and W pumice is dated at 3,400 or 3,500 years of age but can still be considered as "hard." These fragments, however, have coatings of translocated sesquioxides and organic matter. These coatings are yellow or yellowish red. The coatings are evidence of a high degree of weathering, and horizons of pumice with such coatings are designated as Bhs or Bs to indicate illuviation or the movement of weathered iron.

Tradedollar and Zynbar soils are examples of soils that formed in very deep deposits of highly weathered tephra. Over time soil moisture, leaching, and frost action have softened and broken down the glass shards. They are not abrasive or hard but feel greasy and smear when rubbed between the thumb and index finger. The colors of the soil indicate that a high degree of oxidation has occurred.

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Glossary

ggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

lluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

lluvium. Material, such as sand, silt, or clay, deposited on land by streams.

rea reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

sh (volcanic). See volcanic ash.

vailable water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 2.0
Low	2.0 to 3.75
Moderate	3.75 to 5.0
Moderately high	5.0 to 7.5
High	More than 7.5

alanche debris flow. A large mass of snow, ice, or rock that becomes detached from a mountain slope and slides or falls suddenly downward.

ck slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

dland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4½ feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Breccia. A coarse grained clastic rock composed of angular rock fragments larger than 2 millimeters in size, commonly cemented together in a finer grained matrix of varying composition and origin. The consolidated equivalent of rubble.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Cirque. Semicircular, concave, bowllike areas that have steep faces primarily resulting from abrasion by glacial ice and snow.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter, in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section (particle-size control section). The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops using a planned system of rotation and management practices.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Debris flow (mudflow). A mass movement process involving rapid flow of highly viscous mixtures of debris, water, and entrapped air. Water content is as much as 60 percent. A mudflow is a type of debris flow of clastic particles of sand size and finer.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Detritus. Loose fragments, particles, or grains that have been formed by the disintegration of rock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and low water holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and low water holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have intermediate water holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless artificial drainage is provided. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. They are wet enough to prevent the growth of important crops (except rice) unless artificially drained.

Drainage, surface. Runoff, or surface flow of water, from an area.

Duff. A term used to identify a generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, and clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of men and equipment in fire fighting. Designated roads also serve as firebreaks.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (or 300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Full bench construction (road building). Construction of roads on side slopes where excavated material is not sidecast but is hauled away to a disposal or storage area.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard rock. Rock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which wa originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

E horizon.—The mineral horizon in which the ma feature is loss of silicate clay, iron, aluminum, or some combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

R layer.—Consolidated rock beneath the soil. Th rock commonly underlies a C horizon, but it can directly below an A or a B horizon.

Humus. The well decomposed, more or less stable pa of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics The chief consideration is the inherent capacity soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lahar. Rock debris mobilized by water and derived from a volcano.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lava casts. The hollow impression left when a tree has been engulfed by a lava flow. As the tree is carbonized by the heat from the surrounding molten rock, water escaping from the trunk cools a thin crust of lava, which hardens around the tree trunk. The trunk decomposes, leaving a lava mold in the exact shape of the tree.

Lava tubes. Caves or tubes formed inside a lava flow. Although there are several means by which lava caves can be created, the most common explanation is that the liquid interior of a lava stream continues to flow after the tops and sides have cooled and hardened. The center of the flow then drains away.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Mean annual increment. The average yearly volume growth of a stand of trees from the year of origin to the age under consideration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color in hue of 10YR, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Pumice. Porous tephra fragments (more than 2 millimeters in size) ejected during volcanic activity. They are light weight and commonly are light in color. Pumice fragments will crush under a load.

Pyroclastic. The Greek word for "fire-broken," referring to fragmented volcanic rock thrown out during an eruption.

Pyroclastic flow. A volcanic flow of hot gas and fragmental material (pyroclastic); it is composed of either pumice or lithic (nonvesicular) debris, or a mixture of both.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Reforestation. Tree seedlings that are planted or become naturally established in an area of land that was once forested. Also includes the physical acts associated with planting.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Scoria. Porous tephra fragments (more than 2 millimeters in size) ejected during volcanic activity. They are lightweight and commonly are dark red or black. Scoria fragments can be crushed between thumb and finger.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series , soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site class. A grouping of site indexes into 5 to 7 production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that show the average height of dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. The paths left by the skidded logs and the bulldozer tractor used to pull them.

Skidding. A method of moving felled trees to a nearby central area.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Suitable surface (logging roads). Rock of adequate hardness and size used to surface a road that can withstand repeated and long-term logging truck traffic.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep, rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Tephra. Fragmental volcanic debris that is transported from the crater through the air. Does not denote properties of composition, vesicularity, or grain size.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Volcanic ash. Tephra particles less than 2 millimeters in size ejected during volcanic activity. Does not denote properties of composition, vesicularity, or color.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Windthrow. The action of uprooting and tipping over trees by the wind.

Yarding. A logging term meaning to move a log from the area in which it was cut to a landing or loading area.

Yarding paths. The paths left from cable yarded logs as they are pulled uphill or downhill to a nearby central area.

Yield (woodland). The volume of wood fiber from harvested trees taken from a certain unit of area. Usually measured in board feet or cubic feet per acre.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-73 at Bonneville Dam, OR)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	42.4	32.2	37.3	58	13	106	13.14	7.03	18.14	18	8.2
February---	47.6	35.2	41.4	62	22	106	8.14	4.85	11.09	14	1.1
March------	51.9	36.4	44.2	69	26	151	8.45	5.34	11.26	16	1.1
April------	58.8	41.0	49.9	79	31	297	5.31	3.06	7.15	11	0.0
May--------	66.1	46.5	56.3	89	34	505	3.52	2.03	4.73	8	0.0
June-------	71.3	52.1	61.7	93	40	651	2.52	1.16	3.61	6	0.0
July-------	78.3	56.1	67.2	99	46	843	0.70	---	1.21	2	0.0
August-----	78.1	55.7	66.9	99	46	834	1.47	0.17	2.45	3	0.0
September--	73.0	52.4	62.7	94	41	681	3.11	1.27	4.60	6	0.0
October----	62.1	46.1	54.1	80	36	437	6.83	3.21	9.77	12	0.0
November---	50.7	39.2	45.0	65	26	178	10.85	5.92	14.87	15	0.4
December---	44.1	34.2	39.2	61	17	66	13.14	9.03	16.90	18	2.3
Yearly:											
Average--	60.4	43.9	52.2	---	---	---	---	---	---	---	---
Extreme--	---	---	---	102	6	---	---	---	---	---	---
Total----	---	---	---	---	---	4,855	77.18	66.40	87.57	129	13.1

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

(Recorded in the period 1959-78 at Cougar, WA)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	^oF	^oF	^oF	^oF	^oF	Units	In	In	In		In
anuary----	41.3	31.5	36.4	55	15	36	19.66	9.98	27.57	19	14.5
ebruary---	46.9	34.4	40.7	63	22	82	13.52	8.12	18.35	15	4.6
arch------	50.2	34.8	42.6	72	24	125	12.44	6.88	16.98	17	1.9
pril------	56.1	37.9	47.0	78	30	221	7.83	4.91	10.46	13	0.1
ay--------	64.2	43.2	53.7	89	33	425	5.02	2.86	6.78	10	0.0
une-------	71.3	49.4	60.4	95	39	612	3.64	1.62	5.28	6	0.0
uly-------	78.3	52.3	65.3	101	42	784	1.34	0.18	2.25	3	0.0
ugust-----	77.1	52.4	64.8	102	42	769	2.81	0.46	4.62	5	0.0
eptember--	70.9	49.4	60.1	93	39	603	4.50	1.12	7.18	7	0.0
ctober----	61.2	43.8	52.6	82	34	391	9.21	4.38	13.14	12	0.0
ovember---	49.6	37.7	43.7	65	25	148	17.09	10.71	22.83	17	1.6
ecember---	42.8	33.5	38.1	56	17	55	20.43	13.11	27.06	19	6.1
early:											
Average--	59.2	41.7	50.5	---	---	---	---	---	---	---	---
Extreme--	---	---	---	103	9	---	---	---	---	---	---
Total----	---	---	---	---	---	4,251	117.49	2.22	33.43	143	28.8

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

(Recorded in the period 1951-77 at Wind River, WA)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	37.4	26.4	31.9	53	-2	37	19.20	9.61	27.03	17	53.9
February---	43.8	28.4	36.0	60	11	36	12.88	7.74	17.48	13	13.4
March------	48.4	29.6	39.0	68	17	63	12.05	7.41	16.21	14	12.9
April------	57.7	32.9	45.3	81	23	167	6.35	3.25	8.88	9	0.4
May--------	68.0	38.8	53.4	93	27	421	3.41	2.08	4.59	8	0.0
June-------	73.5	45.0	59.3	95	32	579	2.22	1.04	3.17	5	0.0
July-------	81.4	47.9	64.7	101	37	766	0.59	0.03	1.00	2	0.0
August-----	80.0	47.5	63.7	101	36	735	1.59	0.11	2.71	3	0.0
September--	74.1	42.6	58.4	95	29	552	2.93	0.67	4.72	4	0.0
October----	61.1	36.7	48.9	81	24	281	8.27	2.89	12.58	9	0.0
November---	46.5	31.7	39.1	62	16	76	14.99	8.09	20.63	14	3.3
December---	39.7	29.2	34.5	53	11	26	17.81	12.07	23.05	16	25.5
Yearly:											
Average--	59.3	36.4	47.9	---	---	---	---	---	---	---	---
Extreme--	---	---	---	105	-4	---	---	---	---	---	---
Total----	---	---	---	---	---	3,739	102.29	85.55	18.45	114	109.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for range vegetation in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
(Recorded in the period 1951-73 at Bonneville Dam, OR)			
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 9	Mar. 31	Apr. 29
2 years in 10 later than--	Feb. 22	Mar. 15	Apr. 20
5 years in 10 later than--	Jan. 23	Febr. 13	Apr. 2
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 22	Nov. 13	Nov. 4
2 years in 10 earlier than--	Dec. 4	Nov. 23	Nov. 9
5 years in 10 earlier than--	Dec. 29	Dec. 13	Nov. 21
(Recorded in the period 1959-78 at Cougar, WA)			
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 5	Mar. 28	May 13
2 years in 10 later than--	Feb. 20	Mar. 15	May 5
5 years in 10 later than--	Jan. 25	Febr. 18	Apr. 19
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 20	Nov. 7	Oct. 29
2 years in 10 earlier than--	Dec. 1	Nov. 18	Nov. 5
5 years in 10 earlier than--	Dec. 22	Dec. 10	Nov. 18

TABLE 2.--FREEZE DATES IN SPRING AND FALL--Continued

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
(Recorded in the period 1951-77 at Wind River, WA)			
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 30	May 18	Jun. 8
2 years in 10 later than--	Apr. 19	May 12	Jun. 2
5 years in 10 later than--	Mar. 27	Apr. 29	May. 22
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 20	Sept. 26	Sept. 13
2 years in 10 earlier than--	Oct. 28	Oct. 4	Sept. 20
5 years in 10 earlier than--	Nov. 11	Oct. 19	Oct. 2

TABLE 3.--GROWING SEASON

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
(Recorded in the period 1951-73 at Bonneville Dam, OR)			
	Days	Days	Days
9 years in 10	286	253	204
8 years in 10	300	269	214
5 years in 10	348	300	232
2 years in 10	>365	341	250
1 year in 10	>365	>365	259
(Recorded in the period 1959-78 at Cougar, WA)			
	Days	Days	Days
9 years in 10	295	247	179
8 years in 10	304	263	191
5 years in 10	327	295	212
2 years in 10	>365	326	233
1 year in 10	>365	342	244
(Recorded in the period 1951-77 at Wind River, WA)			
	Days	Days	Days
9 years in 10	191	146	108
8 years in 10	204	155	117
5 years in 10	229	172	133
2 years in 10	254	189	150
1 year in 10	267	198	159

TABLE 4A.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS (PREERUPTION)

Map symbol	Soil name	Acres	Percent
1	Andic Cryumbrepts, 5 to 65 percent slopes	3,825	1.1
2	Arents, 0 to 5 percent slopes	690	0.2
3	Aschoff very gravelly loam, 5 to 30 percent slopes	3,300	1.0
4	Aschoff very gravelly loam, 30 to 65 percent slopes	12,150	3.5
5	Aschoff-Rock outcrop complex, 30 to 65 percent slopes	8,950	2.6
6	Badland	1,000	0.3
7	Bandid loamy sand, 30 to 65 percent slopes	480	0.1
8	Bandid loamy sand, 65 to 90 percent slopes	1,025	0.3
9	Bandid cindery sandy loam, 5 to 30 percent slopes	450	0.1
10	Bandid cindery sandy loam, 30 to 65 percent slopes	1,325	0.4
11	Bandid cindery sandy loam, 65 to 90 percent slopes	1,900	0.6
12	Bannel cindery sandy loam, 5 to 30 percent slopes	1,675	0.5
13	Bannel cindery sandy loam, 30 to 65 percent slopes	3,075	0.9
14	Bannel cindery sandy loam, 65 to 90 percent slopes	1,500	0.4
15	Benham very cindery sandy loam, 0 to 30 percent slopes	350	0.1
16	Benham very cindery sandy loam, 30 to 65 percent slopes	200	0.1
17	Bonneville stony sandy loam	1,375	0.4
18	Cattcreek very cindery loamy sand, 65 to 90 percent slopes	280	0.1
19	Cattcreek very cindery loamy sand, cold, 30 to 65 percent slopes	465	0.1
20	Cattcreek very cindery loamy sand, cold, 65 to 90 percent slopes	1,275	0.4
21	Chemawa loam, 2 to 8 percent slopes	2,000	0.6
22	Chemawa loam, 8 to 15 percent slopes	1,300	0.4
23	Chemawa loam, 15 to 30 percent slopes	2,450	0.7
24	Chemawa loam, 30 to 50 percent slopes	400	0.1
25	Cinnamon sandy loam, 2 to 30 percent slopes	7,950	2.3
26	Cinnamon sandy loam, 30 to 65 percent slopes	5,650	1.6
27	Cinnamon sandy loam, 65 to 90 percent slopes	235	0.1
28	Colter cindery sandy loam, 0 to 30 percent slopes	695	0.2
29	Colter cindery sandy loam, 30 to 65 percent slopes	1,125	0.3
30	Colter cindery sandy loam, 65 to 90 percent slopes	2,625	0.8
31	Colter cindery sandy loam, cold, 0 to 30 percent slopes	255	0.1
32	Colter cindery sandy loam, cold, 30 to 65 percent slopes	1,010	0.3
33	Colter cindery sandy loam, cold, 65 to 90 percent slopes	1,625	0.5
34	Colter, cold-Rock outcrop complex, 30 to 65 percent slopes	820	0.2
35	Cryandepts, 45 to 120 percent slopes	805	0.2
36	Dougan very gravelly loam, 5 to 30 percent slopes	325	0.1
37	Dougan very gravelly loam, 30 to 65 percent slopes	5,550	1.6
38	Forsyth cindery loamy sand, 65 to 120 percent slopes	1,575	0.5
39	Forsyth cobbly loamy sand, 0 to 30 percent slopes	600	0.2
40	Forsyth stony loamy sand, 0 to 30 percent slopes	340	0.1
41	Fortran cindery loamy sand, 65 to 120 percent slopes	1,290	0.4
42	Haplumbrepts, 0 to 3 percent slopes	330	0.1
43	Hatchet gravelly sandy loam, 30 to 65 percent slopes	220	0.1
44	Hatchet gravelly sandy loam, 65 to 90 percent slopes	990	0.3
45	Hatchet gravelly sandy loam, cold, 30 to 65 percent slopes	190	0.1
46	Hatchet gravelly sandy loam, cold, 65 to 90 percent slopes	710	0.2
47	Hatchet-Rock outcrop complex, 65 to 90 percent slopes	900	0.3
48	Hatchet, cold-Rock outcrop complex, 30 to 65 percent slopes	270	0.1
49	Hatchet, cold-Rock outcrop complex, 65 to 90 percent slopes	825	0.2
50	Hesson clay loam, 5 to 15 percent slopes	455	0.1
51	Hesson clay loam, 15 to 30 percent slopes	200	0.1
52	Hesson clay loam, 30 to 40 percent slopes	1,050	0.3
53	Histic Cryaquepts, 0 to 5 percent slopes	675	0.2
54	Hoffstadt very gravelly sandy loam, 2 to 30 percent slopes	205	0.1
55	Hoffstadt very gravelly sandy loam, 30 to 65 percent slopes	310	0.1
56	Hood loam, 15 to 30 percent slopes	300	0.1
57	Kinney loam, 5 to 30 percent slopes	1,580	0.5
58	Kinney loam, 30 to 65 percent slopes	6,210	1.8
59	Kinney loam, 30 to 65 percent east slopes	1,150	0.3
60	Lithic Umbric Vitrandepts, 0 to 15 percent slopes	4,660	1.4
61	Lonestar cindery sandy loam, 5 to 30 percent slopes	4,375	1.3
62	Lonestar cindery sandy loam, 30 to 65 percent slopes	1,475	0.4
63	Lonestar cindery sandy loam, 65 to 90 percent slopes	290	0.1
64	McBee silt loam	500	0.1

TABLE 4A.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS (PREERUPTION)--Continued

Map ymbol	Soil name	Acres	Percent
65	McDoug silt loam	465	0.1
66	McElroy gravelly loam, 5 to 15 percent slopes	635	0.2
67	McElroy gravelly loam, 15 to 30 percent slopes	1,225	0.4
68	McElroy gravelly loam, 30 to 65 percent slopes	7,755	2.3
69	McElroy very stony loam, 5 to 15 percent slopes	615	0.2
70	Minniepeak cindery sandy loam, 5 to 30 percent slopes	1,925	0.6
71	Minniepeak cindery sandy loam, 30 to 65 percent slopes	765	0.2
72	Minniepeak cindery sandy loam, 65 to 90 percent slopes	575	0.2
73	Mossyrock silt loam, 2 to 5 percent slopes	675	0.2
74	Mossyrock silt loam, 5 to 15 percent slopes	200	0.1
75	Mountzion clay loam, 2 to 15 percent slopes	1,900	0.6
76	Mountzion clay loam, 15 to 30 percent slopes	1,325	0.4
77	Mountzion clay loam, 30 to 65 percent slopes	1,850	0.5
78	Pelee sandy loam, 5 to 30 percent slopes	1,325	0.4
79	Pelee sandy loam, 30 to 65 percent slopes	3,325	1.0
80	Pelee sandy loam, 65 to 90 percent slopes	1,800	0.5
81	Pelee-Rock outcrop complex, 65 to 90 percent	1,100	0.3
82	Pilchuck very fine sandy loam	460	0.1
83	Pillery fine sandy loam	540	0.2
4	Pinchot cindery sandy loam, 0 to 30 percent slopes	1,435	0.4
5	Pinchot cindery sandy loam, 50 to 90 percent slopes	430	0.1
6	Pinoty sandy loam, 0 to 30 percent slopes	555	0.2
7	Pits	75	*
8	Polepatch extremely bouldery loamy sand, 0 to 30 percent slopes	1,975	0.6
9	Polepatch extremely bouldery loamy sand, cold, 0 to 30 percent slopes	4,250	1.2
0	Riverwash	1,060	0.3
1	Rock outcrop-Cattcreek complex, cold, 65 to 90 percent slopes	6,275	1.8
2	Rock outcrop-Rubble land complex	17,525	5.1
3	Rock outcrop-Xerorthents complex, 50 to 90 percent slopes	1,740	0.5
4	Shoestring fine sandy loam, 0 to 30 percent slopes	5,675	1.7
5	Shoestring fine sandy loam, 50 to 90 percent slopes	525	0.2
6	Sinnice extremely cindery loamy sand, 5 to 30 percent slopes	1,640	0.5
7	Sinnice extremely cindery loamy sand, 30 to 65 percent slopes	1,600	0.5
8	Sinnice extremely cindery loamy sand, 65 to 90 percent slopes	4,025	1.2
9	Sinnice extremely cindery loamy sand, cold, 5 to 30 percent slopes	500	0.1
00	Sinnice extremely cindery loamy sand, cold, 30 to 65 percent slopes	710	0.2
01	Sinnice extremely cindery loamy sand, cold, 65 to 90 percent slopes	1,075	0.3
02	Sinnice, cold-Rock outcrop complex, 65 to 80 percent slopes	1,960	0.6
03	Skamania very fine sandy loam, 0 to 8 percent slopes	975	0.3
04	Skamania very fine sandy loam, 8 to 15 percent slopes	630	0.2
05	Skamania very fine sandy loam, 15 to 30 percent slopes	490	0.1
06	Skamania very fine sandy loam, 30 to 40 percent slopes	110	*
07	Skelida silt loam, 5 to 15 percent slopes	1,050	0.3
08	Skelida silt loam, 15 to 30 percent slopes	545	0.2
09	Skoly stony loam, 2 to 15 percent slopes	2,400	0.7
10	Skoly stony loam, 15 to 30 percent slopes	3,125	0.9
11	Skoly stony loam, 30 to 65 percent slopes	4,750	1.4
12	Skoly-Rock outcrop complex, 5 to 30 percent slopes	410	0.1
13	Skoly-Rock outcrop complex, 30 to 65 percent slopes	2,575	0.7
14	St. Helens sandy loam, 0 to 30 percent slopes	2,825	0.8
15	St. Martin gravelly silty clay loam, 2 to 15 percent slopes	1,225	0.4
16	St. Martin gravelly silty clay loam, 15 to 30 percent slopes	1,700	0.5
17	St. Martin gravelly silty clay loam, 30 to 65 percent slopes	8,925	2.6
18	St. Martin gravelly silty clay loam, slumped, 2 to 30 percent slopes	1,450	0.4
19	Stabbart clay loam	595	0.2
20	Stabler loam, 0 to 8 percent slopes	4,800	1.4
21	Stabler loam, 8 to 30 percent slopes	1,475	0.4
22	Stabler loam, 30 to 65 percent slopes	520	0.2
23	Steever stony clay loam, 2 to 30 percent slopes	6,475	1.9
24	Steever stony clay loam, 30 to 65 percent slopes	4,625	1.3
25	Steever-Rock outcrop complex, 2 to 30 percent slopes	375	0.1
26	Steever-Rock outcrop complex, 30 to 65 percent slopes	910	0.3

See footnote at end of table.

TABLE 4A.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS (PREERUPTION)--Continued

Map symbol	Soil name	Acres	Percent
127	Stevenson loam, 2 to 15 percent slopes	615	0.2
128	Stevenson loam, 15 to 30 percent slopes	1,425	0.4
129	Stevenson loam, 30 to 50 percent slopes	670	0.2
130	Swift cindery sandy loam, 2 to 30 percent slopes	2,175	0.6
131	Swift cindery sandy loam, 30 to 65 percent slopes	7,900	2.3
132	Swift cindery sandy loam, 65 to 90 percent slopes	3,100	0.9
133	Swift-Rock outcrop complex, 30 to 65 percent slopes	835	0.2
134	Swift-Rock outcrop complex, 65 to 90 percent slopes	3,475	1.0
135	Timberhead gravelly loam, 5 to 30 percent slopes	1,150	0.3
136	Timberhead gravelly loam, 30 to 65 percent slopes	1,175	0.3
137	Tradedollar sandy loam, 0 to 30 percent slopes	1,125	0.3
138	Tradedollar sandy loam, 30 to 65 percent slopes	2,400	0.7
139	Tradedollar sandy loam, 65 to 90 percent slopes	1,575	0.5
140	Tradedollar sandy loam, warm, 0 to 30 percent slopes	535	0.2
141	Tradedollar sandy loam, warm, 30 to 65 percent slopes	1,900	0.6
142	Tradedollar sandy loam, warm, 65 to 90 percent slopes	1,100	0.3
143	Typic Dystrandepts, 5 to 65 percent slopes	760	0.2
144	Underwood loam, 2 to 15 percent slopes	1,635	0.5
145	Underwood loam, 15 to 30 percent slopes	1,625	0.5
146	Underwood loam, 30 to 50 percent slopes	2,575	0.7
147	Undusk gravelly loam, 5 to 30 percent slopes	1,525	0.4
148	Undusk gravelly loam, 30 to 65 percent slopes	3,925	1.1
149	Vanson sandy loam, 5 to 30 percent slopes	1,525	0.4
150	Vanson sandy loam, 30 to 65 percent slopes	2,250	0.7
151	Vanson sandy loam, 65 to 90 percent slopes	3,650	1.1
152	Vanson sandy loam, cold, 5 to 30 percent slopes	370	0.1
153	Vanson sandy loam, cold, 30 to 65 percent slopes	1,540	0.4
154	Vanson-Rock outcrop complex, 30 to 65 percent slopes	160	*
155	Vanson-Rock outcrop complex, 65 to 90 percent slopes	2,400	0.7
156	Vanson, cold-Rock outcrop complex, 65 to 90 percent slopes	385	0.1
157	Washougal loam, 0 to 3 percent slopes	530	0.2
158	Washougal gravelly loam, 2 to 8 percent slopes	860	0.3
159	Washougal gravelly loam, 8 to 30 percent slopes	410	0.1
160	Washougal gravelly loam, 30 to 50 percent slopes	360	0.1
161	Xerorthents-Rock outcrop complex, 50 to 90 percent slopes	2,775	0.8
162	Yalelake sandy loam, 2 to 30 percent slopes	3,800	1.1
163	Yalelake sandy loam, 30 to 65 percent slopes	1,425	0.4
164	Yalelake sandy loam, 65 to 90 percent slopes	295	0.1
165	Zygore gravelly loam, 5 to 30 percent slopes	4,425	1.3
166	Zygore gravelly loam, 30 to 65 percent slopes	15,400	4.5
167	Zygore-Rock outcrop complex, 30 to 65 percent slopes	6,550	1.9
168	Zymer sandy loam, 2 to 30 percent slopes	280	0.1
169	Zymer sandy loam, 30 to 65 percent slopes	560	0.2
170	Zymer sandy loam, 65 to 90 percent slopes	700	0.2
171	Zymer-Rock outcrop complex, 30 to 65 percent slopes	285	0.1
172	Zymer-Rock outcrop complex, 65 to 90 percent slopes	1,600	0.5
173	Zynbar gravelly silt loam, till substratum, 8 to 30 percent slopes	330	0.1
174	Water	1,485	0.4
	Total	343,785	100.0

* Less than 0.1 percent.

TABLE 4B.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS (POSTERUPTION)

(Total acreage is the total for those soils that are overblown)

Map symbol	Soil name	Acres	Percent
200	Bandid extremely cindery loamy sand, overblown, 5 to 30 percent slopes	50	0.1
201	Bandid extremely cindery loamy sand, overblown, 30 to 65 percent slopes	860	1.5
202	Bandid extremely cindery loamy sand, overblown, 65 to 90 percent slopes	1,813	3.1
203	Cattcreek loamy sand, overblown, cold, 30 to 65 percent slopes	115	0.2
204	Cattcreek loamy sand, overblown, cold, 65 to 90 percent slopes	365	0.6
205	Cinnamon loamy sand, overblown, 2 to 30 percent slopes	109	0.2
206	Colter loamy sand, overblown, 0 to 30 percent slopes	222	0.4
207	Colter loamy sand, overblown, 30 to 65 percent slopes	331	0.6
208	Colter loamy sand, overblown, 65 to 90 percent slopes	754	1.3
209	Colter loamy sand, overblown, cold, 0 to 30 percent slopes	88	0.1
210	Colter loamy sand, overblown, cold, 30 to 65 percent slopes	707	1.2
211	Colter loamy sand, overblown, cold, 65 to 90 percent slopes	1,134	1.9
212	Colter extremely cindery loamy sand, overblown, 30 to 65 percent slopes	129	0.2
213	Colter, overblown, cold-Rock outcrop complex, 30 to 65 percent slopes	494	0.8
214	Cryandepts extremely cindery loamy sand, overblown, 45 to 120 percent slopes	667	1.1
215	Elkprairie loamy sand, 5 to 30 percent slopes	416	0.7
216	Hatchet loamy sand, overblown, 65 to 90 percent slopes	1,219	2.1
217	Hatchet loamy sand, overblown, cold, 30 to 65 percent slopes	120	0.2
218	Hatchet loamy sand, overblown, cold, 65 to 90 percent slopes	670	1.1
219	Hatchet, overblown-Rock outcrop complex, 65 to 90 percent slopes	124	0.2
220	Hatchet, overblown, cold-Rock outcrop complex, 30 to 65 percent slopes	104	0.2
221	Hatchet, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes	106	0.2
222	Histic Cryaquepts loamy sand, overblown, 0 to 5 percent slopes	123	0.2
223	Lonestar loamy sand, overblown, 5 to 30 percent slopes	640	1.1
224	Lonestar loamy sand, overblown, 30 to 65 percent slopes	286	0.4
225	Lonestar loamy sand, overblown, 65 to 90 percent slopes	190	0.3
226	Minniepeak loamy sand, overblown, 5 to 30 percent slopes	1,080	1.8
227	Minniepeak loamy sand, overblown, 30 to 65 percent slopes	373	0.6
228	Minniepeak extremely cindery loamy sand, overblown, 30 to 65 percent slopes	305	0.5
229	Minniepeak extremely cindery loamy sand, overblown, 65 to 90 percent slopes	496	0.8
230	Obscurity very bouldery sand, 0 to 30 percent slopes	3,370	5.8
231	Panhandle extremely cindery loamy sand, 0 to 20 percent slopes	1,174	2.0
232	Pelee extremely cindery loamy sand, overblown, 5 to 30 percent slopes	345	0.6
233	Pelee extremely cindery loamy sand, overblown, 30 to 65 percent slopes	1,266	2.2
234	Pelee extremely cindery loamy sand, overblown, 65 to 90 percent slopes	1,149	2.0
235	Pelee overblown-Rock outcrop complex, 65 to 90 percent slopes	1,050	1.8
236	Polepatch loamy sand, overblown, 0 to 30 percent slopes	209	0.4
237	Rock outcrop-Cattcreek, overblown, cold complex, 65 to 90 percent slopes	3,646	6.2
238	Shoestring loamy sand, overblown, 0 to 30 percent slopes	222	0.4
239	Shoestring loamy sand, overblown, 50 to 90 percent slopes	95	0.2
240	Sinnice extremely cindery loamy sand, overblown, 5 to 30 percent slopes	1,469	2.5
241	Sinnice extremely cindery loamy sand, overblown, 30 to 65 percent slopes	1,535	2.6
242	Sinnice extremely cindery loamy sand, overblown, 65 to 90 percent slopes	3,853	6.6
243	Sinnice extremely cindery loamy sand, overblown, cold, 5 to 30 percent slopes	333	0.6
244	Sinnice extremely cindery loamy sand, overblown, cold, 30 to 65 percent slopes	735	1.3
245	Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90 percent slopes	949	1.6
246	Sinnice, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes	1,855	3.2
247	Sinnice loamy sand, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes	237	0.4
248	Studebaker very gravelly loamy sand, 0 to 20 percent slopes	6,182	10.6
249	Swift loamy sand, overblown, 2 to 30 percent slopes	112	0.2
250	Swift, overblown-Rock outcrop complex, 65 to 90 percent slopes	82	0.1
251	Tradedollar loamy sand, overblown, 0 to 30 percent slopes	136	0.2
252	Tradedollar loamy sand, overblown, 30 to 65 percent slopes	1,172	2.0
253	Tradedollar loamy sand, overblown, 65 to 90 percent slopes	1,195	2.0
254	Tradedollar loamy sand, overblown, warm, 0 to 30 percent slopes	309	0.5
255	Tradedollar loamy sand, overblown, warm, 30 to 65 percent slopes	956	1.6
256	Tradedollar loamy sand, overblown, warm, 65 to 90 percent slopes	410	0.7
257	Vanson loamy sand, overblown, 5 to 30 percent slopes	361	0.6
258	Vanson loamy sand, overblown, 30 to 65 percent slopes	1,280	2.2
259	Vanson loamy sand, overblown, 65 to 90 percent slopes	1,652	2.8
260	Vanson loamy sand, overblown, cold, 5 to 30 percent slopes	262	0.4
261	Vanson loamy sand, overblown, cold, 30 to 65 percent slopes	1,147	2.0

TABLE 4B.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS (POSTERUPTION)--Continued

Map symbol	Soil name	Acres	Percent
262	Vanson extremely cindery loamy sand, overblown, 65 to 90 percent slopes	53	0.1
263	Vanson, overblown-Rock outcrop complex, 30 to 65 percent slopes	100	0.2
264	Vanson, overblown-Rock outcrop complex, 65 to 90 percent slopes	273	0.4
265	Vanson, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes	411	0.7
266	Wakepish very gravelly sandy loam, 0sto 30 percent slopes	4,824	0.2
	Total	58,500	100.0

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE (PREERUPTION)

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only preeruption soils are listed in this table because posteruption soils are not suited to crops and pasture)

Soil name and map symbol	Land capability	Grass-legume hay	Pasture	Wine grapes	Oats	Green chop	Pears	Apples
		Tons	AUM*	Tons	Bu	Tons	Bu	Bu
1--------------- Andic Cryumbrepts	VIe	---	---	---	---	---	---	---
2--------------- Arents	IVs	---	---	---	---	---	---	---
3--------------- Aschoff	IVe	---	---	---	---	---	---	---
4--------------- Aschoff	VIIe	---	---	---	---	---	---	---
5**:								
Aschoff--------	VIIe	---	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
6**------------- Badland	VIIIe	---	---	---	---	---	---	---
7, 8------------ Bandid	VIIe	---	---	---	---	---	---	---
9--------------- Bandid	IVe	---	---	---	---	---	---	---
10, 11---------- Bandid	VIIe	---	---	---	---	---	---	---
12-------------- Bannel	IVe	---	---	---	---	---	---	---
13, 14---------- Bannel	VIIe	---	---	---	---	---	---	---
15-------------- Benham	IVe	---	---	---	---	---	---	---
16-------------- Benham	VIIe	---	---	---	---	---	---	---
17-------------- Bonneville	IVs	2.0	4.5	---	---	---	---	---
18, 19, 20------ Cattcreek	VIIe	---	---	---	---	---	---	---
21-------------- Chemawa	IIe	4.0	12.0	5.0	110	10.0	415	310
22-------------- Chemawa	IIIe	4.0	12.0	5.0	110	10.0	415	310
23-------------- Chemawa	IVe	3.5	10.0	---	100	9.0	415	310

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE (PREERUPTION)--Continued

Soil name and map symbol	Land capability	Grass-legume hay	Pasture	Wine grapes	Oats	Green chop	Pears	Apples
		Tons	AUM*	Tons	Bu	Tons	Bu	Bu
24-------------- Chemawa	VIIe	---	---	---	---	---	---	---
25-------------- Cinnamon	IVe	---	---	---	---	---	---	---
26, 27---------- Cinnamon	VIIe	---	---	---	---	---	---	---
28-------------- Colter	VIs	---	---	---	---	---	---	---
29, 30---------- Colter	VIIe	---	---	---	---	---	---	---
31-------------- Colter	VIs	---	---	---	---	---	---	---
32, 33---------- Colter	VIIe	---	---	---	---	---	---	---
34**:								
Colter----------	VIIe	---	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
35-------------- Cryandepts	VIIe	---	---	---	---	---	---	---
36-------------- Dougan	VIe	---	---	---	---	---	---	---
37-------------- Dougan	VIIe	---	---	---	---	---	---	---
38-------------- Forsyth	VIIe	---	---	---	---	---	---	---
39, 40---------- Forsyth	VIs	---	---	---	---	---	---	---
41-------------- Fortran	VIIe	---	---	---	---	---	---	---
42-------------- Haplumbrepts	IIIw	3.0	7.5	---	80	9.0	---	---
43, 44, 45, 46-- Hatchet	VIIe	---	---	---	---	---	---	---
47**, 48**, 49**:								
Hatchet--------	VIIe	---	---	---	---	---	---	---
Rock outcrop--	VIIIs	---	---	---	---	---	---	---
50-------------- Hesson	IIIe	4.0	9.0	---	90	10.0	---	---
51-------------- Hesson	IVe	3.5	8.0	---	90	9.0	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE (PREERUPTION)--Continued

Soil name and map symbol	Land capability	Grass-legume hay	Pasture	Wine grapes	Oats	Green chop	Pears	Apples
		Tons	AUM*	Tons	Bu	Tons	Bu	Bu
52-------------- Hesson	VIe	---	7.0	---	---	---	---	---
53-------------- Histic Cryaquepts	VIw	---	---	---	---	---	---	---
54-------------- Hoffstadt	IVe	---	---	---	---	---	---	---
55-------------- Hoffstadt	VIIe	---	---	---	---	---	---	---
56-------------- Hood	IVe	3.5	9.0	---	100	---	415	310
57-------------- Kinney	IVe	3.5	9.0	---	---	---	---	---
58, 59---------- Kinney	VIIe	---	---	---	---	---	---	---
60-------------- Lithic Umbric Vitrandepts	VIIs	---	---	---	---	---	---	---
61-------------- Lonestar	VIs	---	---	---	---	---	---	---
62, 63---------- Lonestar	VIIe	---	---	---	---	---	---	---
64-------------- McBee	IIIw	3.0	7.0	---	80	9.0	---	---
65-------------- McDoug	IIIw	2.0	4.5	---	---	5.5	---	---
66-------------- McElroy	IIIe	2.0	4.5	---	---	5.5	---	---
67-------------- McElroy	IVe	2.0	4.5	---	---	---	---	---
68-------------- McElroy	VIIe	---	---	---	---	---	---	---
69-------------- McElroy	VIs	---	4.0	---	---	---	---	---
70-------------- Minniepeak	VIs	---	---	---	---	---	---	---
71, 72---------- Minniepeak	VIIe	---	---	---	---	---	---	---
73-------------- Mossyrock	IIe	4.0	9.0	---	90	11.0	---	---
74-------------- Mossyrock	IIIe	4.0	9.0	---	90	11.0	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE (PREERUPTION)--Continued

Soil name and map symbol	Land capability	Grass-legume hay	Pasture	Wine grapes	Oats	Green chop	Pears	Apples
		Tons	AUM*	Tons	Bu	Tons	Bu	Bu
75-------------- Mountzion	IIIe	3.5	9.0	---	90	---	---	---
76-------------- Mountzion	IVe	3.0	7.5	---	80	---	---	---
77-------------- Mountzion	VIIe	---	---	---	---	---	---	---
78-------------- Pelee	VIs	---	---	---	---	---	---	---
79, 80---------- Pelee	VIIe	---	---	---	---	---	---	---
81**:								
Pelee----------	VIIe	---	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
82-------------- Pilchuck	IVw	1.5	3.0	---	60	5.0	---	---
83-------------- Pillery	IIIw	1.5	2.5	---	60	4.0	---	---
84-------------- Pinchot	IVe	---	---	---	---	---	---	---
85-------------- Pinchot	VIIe	---	---	---	---	---	---	---
86-------------- Pinoty	IVe	---	---	---	---	---	---	---
87**------------ Pits	VIIIs	---	---	---	---	---	---	---
88, 89---------- Polepatch	VIIs	---	---	---	---	---	---	---
90**------------ Riverwash	VIIIw	---	---	---	---	---	---	---
91--------------								
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
Cattcreek------	VIIe	---	---	---	---	---	---	---
92**:								
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
Rubble land.								
93:								
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
Xerorthents----	VIIs	---	---	---	---	---	---	---
94-------------- Shoestring	VIs	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE (PREERUPTION)--Continued

Soil name and map symbol	Land capability	Grass-legume hay	Pasture	Wine grapes	Oats	Green chop	Pears	Apples
		Tons	AUM*	Tons	Bu	Tons	Bu	Bu
95 Shoestring	VIIe	---	---	---	---	---	---	---
96 Sinnice	VIs	---	---	---	---	---	---	---
97, 98 Sinnice	VIIe	---	---	---	---	---	---	---
99 Sinnice	VIs	---	---	---	---	---	---	---
100, 101 Sinnice	VIIe	---	---	---	---	---	---	---
102**:								
Sinnice	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
103 Skamania	IIe	4.0	9.0	---	90	11.0	---	---
104 Skamania	IIIe	3.5	8.0	---	90	10.0	---	---
105 Skamania	IVe	3.5	8.0	---	85	---	---	---
106 Skamania	VIe	---	8.0	---	---	---	---	---
107 Skelida	IIIe	5.0	11.0	---	100	14.0	---	---
108 Skelida	IVe	---	11.0	---	---	---	---	---
109, 110, 111 Skoly	VIIe	---	---	---	---	---	---	---
112**, 113**:								
Skoly	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
114 St. Helens	IVe	---	---	---	---	---	---	---
115 St. Martin	IVw	---	---	---	---	---	---	---
116 St. Martin	IVe	---	---	---	---	---	---	---
117 St. Martin	VIIe	---	---	---	---	---	---	---
118 St. Martin	VIe	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE (PREERUPTION)--Continued

Soil name and map symbol	Land capability	Grass-legume hay	Pasture	Wine grapes	Oats	Green chop	Pears	Apples
		Tons	AUM*	Tons	Bu	Tons	Bu	Bu
119 Stabbart	IVw	---	---	---	---	---	---	---
120 Stabler	IIe	3.5	7.5	---	80	10.0	---	---
121 Stabler	IVe	3.0	7.0	---	75	---	---	---
122 Stabler	VIIe	---	---	---	---	---	---	---
123 Steever	IVe	2.5	6.0	---	75	---	---	---
124 Steever	VIIe	---	---	---	---	---	---	---
125**:								
Steever	IVe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
126**:								
Steever	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
127 Stevenson	IIIe	2.5	5.5	---	75	7.0	---	---
128 Stevenson	IVe	2.5	5.5	---	75	7.0	---	---
129 Stevenson	VIIe	---	---	---	---	---	---	---
130 Swift	IVe	---	---	---	---	---	---	---
131, 132 Swift	VIIe	---	---	---	---	---	---	---
133**, 134**:								
Swift	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
135 Timberhead	IVe	---	---	---	---	---	---	---
136 Timberhead	VIIe	---	---	---	---	---	---	---
137 Tradedollar	VIs	---	---	---	---	---	---	---
138, 139 Tradedollar	VIIe	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE (PREERUPTION)--Continued

Soil name and map symbol	Land capability	Grass-legume hay	Pasture	Wine grapes	Oats	Green chop	Pears	Apples
		Tons	AUM*	Tons	Bu	Tons	Bu	Bu
140------------- Tradedollar	VIs	---	---	---	---	---	---	---
141, 142-------- Tradedollar	VIIe	---	---	---	---	---	---	---
143------------- Typic Dystrandepts	VIe	---	---	---	---	---	---	---
144------------- Underwood	IIIe	3.5	8.0	---	95	10.0	415	---
145------------- Underwood	IVe	3.5	8.0	---	90	10.0	415	310
146------------- Underwood	VIIe	---	---	---	---	---	---	---
147------------- Undusk	IVe	---	---	---	---	---	---	---
148------------- Undusk	VIIe	---	---	---	---	---	---	---
149------------- Vanson	VIs	---	---	---	---	---	---	---
150, 151-------- Vanson	VIIe	---	---	---	---	---	---	---
152------------- Vanson	VIs	---	---	---	---	---	---	---
153------------- Vanson	VIIe	---	---	---	---	---	---	---
154**, 155**, 156**:								
Vanson---------	VIIe	---	---	---	---	---	---	---
Rock outcrop--	VIIIs	---	---	---	---	---	---	---
157------------- Washougal	IIIs	2.5	5.5	---	65	7.0	---	---
158------------- Washougal	IIIs	2.5	6.0	---	60	7.0	---	---
159------------- Washougal	IVe	2.0	5.0	---	55	5.5	---	---
160------------- Washougal	VIe	---	---	---	---	---	---	---
161**:								
Xerorthents----	VIIs	---	---	---	---	---	---	---
Rock outcrop---	VIIIs	---		---	---	---	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE (PREERUPTION)--Continued

Soil name and map symbol	Land capability	Grass-legume hay	Pasture	Wine grapes	Oats	Green chop	Pears	Apples
		Tons	AUM*	Tons	Bu	Tons	Bu	Bu
162------------- Yalelake	IVe	---	---	---	---	---	---	---
163, 164-------- Yalelake	VIIe	---	---	---	---	---	---	---
165------------- Zygore	IVe	---	---	---	---	---	---	---
166------------- Zygore	VIIe	---	---	---	---	---	---	---
167**:								
Zygore----------	VIIe	---	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
168------------- Zymer	IVe	---	---	---	---	---	---	---
169, 170-------- Zymer	VIIe	---	---	---	---	---	---	---
171**, 172**:								
Zymer----------	VIIe	---	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
173------------- Zynbar	IVe	---	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
1---------------- Andic Cryumbrepts	11R	Severe	Slight	Slight	Moderate	Western hemlock-----	75	11	Noble fir, western hemlock, Douglas fir, Pacific silver fir.
						Douglas fir---------	---	---	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Alaska cedar--------	---	---	
3---------------- Aschoff	17F	Moderate	Moderate	Slight	Severe	Douglas fir---------	125	9	Douglas fir, western hemlock, red alder.
						Western hemlock-----	100	17	
						Red alder-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
4---------------- Aschoff	17R	Severe	Moderate	Slight	Severe	Douglas fir---------	125	9	Douglas fir, western hemlock, red alder.
						Western hemlock-----	100	17	
						Red alder-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
5**:									
Aschoff---------	17R	Severe	Moderate	Slight	Severe	Douglas fir---------	125	9	Douglas fir, western hemlock, red alder.
						Western hemlock-----	100	17	
						Red alder-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
Rock outcrop.									
7---------------- Bandid	12R	Severe	Moderate	Moderate	Slight	Western hemlock-----	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir---------	85	7	
						Pacific silver fir--	---	---	
						Western redcedar----	---	---	
8---------------- Bandid	12R	Severe	Moderate	Moderate	Slight	Western hemlock-----	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir---------	85	7	
						Pacific silver fir--	---	---	
						Western redcedar----	---	---	
9---------------- Bandid	12F	Moderate	Moderate	Moderate	Slight	Western hemlock-----	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir---------	85	7	
						Pacific silver fir--	---	---	
						Western redcedar----	---	---	
10--------------- Bandid	12R	Severe	Moderate	Moderate	Slight	Western hemlock-----	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir---------	85	7	
						Pacific silver fir--	---	---	
						Western redcedar----	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
11 Bandid	12R	Severe	Moderate	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir	85	7	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
12 Bannel	13F	Moderate	Moderate	Moderate	Slight	Western hemlock	85	13	Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	95	8	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
						Red alder	---	---	
13 Bannel	13R	Severe	Moderate	Moderate	Slight	Western hemlock	85	13	Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	95	8	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
						Red alder	---	---	
14 Bannel	13R	Severe	Moderate	Moderate	Slight	Western hemlock	85	13	Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	95	8	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
						Red alder	---	---	
15 Benham	16F	Moderate	Moderate	Moderate	Slight	Western hemlock	105	16	Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	115	11	
						Red alder	---	---	
						Western redcedar	---	---	
						Pacific silver fir	---	---	
16 Benham	16R	Severe	Moderate	Moderate	Slight	Western hemlock	105	16	Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	115	11	
						Red alder	---	---	
						Western redcedar	---	---	
						Pacific silver fir	---	---	
17 Bonneville	8F	Slight	Severe	Moderate	Moderate	Douglas fir	90	8	Douglas fir, red alder.
						Red alder	---	---	
						Bigleaf maple	---	---	
						Oregon white oak	---	---	
						Black cottonwood	---	---	
18 Cattcreek	13R	Severe	Moderate	Moderate	Slight	Western hemlock	86	13	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir	90	8	
						Pacific silver fir	---	---	
						Noble fir	---	---	
						Western redcedar	---	---	
						Western white pine	---	---	
						Alaska cedar	---	---	
19 Cattcreek	7R	Severe	Moderate	Moderate	Slight	Western hemlock	60	7	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	---	---	
						Noble fir	---	---	
						Western white pine	---	---	
						Alaska cedar	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

oil name and map symbol	Ordi-nation symbol	Management concerns				Potential productivity			Trees to plant
		Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	Common trees	Site index	Produc-tivity class*	
attcreek	7R	Severe	Moderate	Moderate	Slight	Western hemlock	60	7	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	---	---	
						Noble fir	---	---	
						Western white pine	---	---	
						Alaska cedar	---	---	
hemawa	11A	Moderate	Slight	Slight	Severe	Douglas fir	114	11	Douglas fir, grand fir.
						Grand fir	105	11	
						Ponderosa pine	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
hemawa	11A	Moderate	Slight	Slight	Severe	Douglas fir	110	10	Douglas fir, grand fir.
						Grand fir	105	11	
						Ponderosa pine	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
hemawa	11A	Moderate	Slight	Slight	Severe	Douglas fir	105	10	Douglas fir, grand fir.
						Grand fir	105	11	
						Ponderosa pine	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
nnamon	14A	Moderate	Slight	Slight	Slight	Western hemlock	96	14	Douglas fir, western hemlock.
						Douglas fir	106	11	
						Western redcedar	---	---	
						Red alder	---	---	
nnamon	14R	Severe	Slight	Slight	Slight	Western hemlock	96	14	Douglas fir, western hemlock.
						Douglas fir	106	11	
						Western redcedar	---	---	
						Red alder	---	---	
nnamon	14R	Severe	Slight	Slight	Slight	Western hemlock	96	14	Douglas fir, western hemlock.
						Douglas fir	106	11	
						Western redcedar	---	---	
						Red alder	---	---	
lter	12F	Moderate	Moderate	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir	90	8	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
						Noble fir	---	---	
lter	12R	Severe	Moderate	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir	90	8	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
						Noble fir	---	---	
lter	12R	Severe	Moderate	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Douglas fir	90	8	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
						Noble fir	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
31	7F	Moderate	Moderate	Moderate	Slight	Western hemlock	65	7	Noble fir, western hemlock, Pacific silver fir.
Colter						Pacific silver fir	---	---	
						Noble fir	---	---	
						Subalpine fir	---	---	
						Douglas fir	---	---	
32	7R	Severe	Moderate	Moderate	Slight	Western hemlock	65	7	Noble fir, western hemlock, Pacific silver fir.
Colter						Pacific silver fir	---	---	
						Noble fir	---	---	
						Subalpine fir	---	---	
						Douglas fir	---	---	
33	7R	Severe	Moderate	Moderate	Slight	Western hemlock	65	7	Noble fir, western hemlock, Pacific silver fir.
Colter						Pacific silver fir	---	---	
						Noble fir	---	---	
						Subalpine fir	---	---	
						Douglas fir	---	---	
34**:									
Colter	7R	Severe	Moderate	Moderate	Slight	Western hemlock	65	7	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Noble fir	---	---	
						Subalpine fir	---	---	
						Douglas fir	---	---	
Rock outcrop.									
36	12D	Moderate	Moderate	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock.
Dougan						Douglas fir	90	7	
						Noble fir	---	---	
						Western redcedar	---	---	
37	12R	Severe	Moderate	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock.
Dougan						Douglas fir	90	7	
						Noble fir	---	---	
						Western redcedar	---	---	
38	7R	Severe	Moderate	Moderate	Moderate	Douglas fir	85	7	Douglas fir, western hemlock, western white pine, western hemlock, Pacific silver fir.
Forsyth						Lodgepole pine	---	---	
						Western hemlock	---	---	
						Western white pine	---	---	
						Pacific silver fir	---	---	
39, 40	7F	Moderate	Moderate	Moderate	Moderate	Douglas fir	85	7	Douglas fir, western hemlock, lodgepole pine, western white pine, Pacific silver fir.
Forsyth						Lodgepole pine	---	---	
						Western hemlock	---	---	
						Western white pine	---	---	
						Pacific silver fir	---	---	
41	14R	Severe	Moderate	Moderate	Severe	Western hemlock	95	14	Douglas fir, western hemlock.
Fortran						Douglas fir	100	9	
						Western redcedar	---	---	
						Red alder	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
42 Haplumbrepts	6W	Moderate	Moderate	Moderate	Severe	Red alder Western redcedar Bigleaf maple	85 --- ---	6 --- ---	Western redcedar, red alder.
43 Hatchet	12R	Severe	Moderate	Moderate	Slight	Western hemlock Douglas fir Pacific silver fir Noble fir Western redcedar	81 94 --- --- ---	12 9 --- --- ---	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
44 Hatchet	12R	Severe	Moderate	Moderate	Slight	Western hemlock Douglas fir Pacific silver fir Noble fir Western redcedar	81 94 --- --- ---	12 9 --- --- ---	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
45 Hatchet	7R	Severe	Moderate	Moderate	Slight	Western hemlock Pacific silver fir Subalpine fir Noble fir Douglas fir	60 --- --- --- ---	7 --- --- --- ---	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
46 Hatchet	7R	Severe	Moderate	Moderate	Slight	Western hemlock Pacific silver fir Subalpine fir Noble fir Douglas fir	60 --- --- --- ---	7 --- --- --- ---	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
47**:									
Hatchet	12R	Severe	Moderate	Moderate	Slight	Western hemlock Douglas fir Pacific silver fir Noble fir Western redcedar	81 94 --- --- ---	12 9 --- --- ---	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
Rock outcrop.									
48**:									
Hatchet	7R	Severe	Moderate	Moderate	Slight	Western hemlock Pacific silver fir Subalpine fir Noble fir Douglas fir	60 --- --- --- ---	7 --- --- --- ---	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
Rock outcrop.									
49**:									
Hatchet	7R	Severe	Moderate	Moderate	Slight	Western hemlock Pacific silver fir Subalpine fir Noble fir Douglas fir	60 --- --- --- ---	7 --- --- --- ---	Noble fir, western hemlock, Pacific silver fir, subalpine fir.

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
49**: Rock outcrop.									
50, 51 Hesson	12A	Moderate	Slight	Slight	Severe	Douglas fir	120	12	Douglas fir, red alder.
						Red alder	---	---	
						Bigleaf maple	---	---	
						Western hemlock	---	---	
						Western redcedar	---	---	
52 Hesson	12R	Severe	Slight	Slight	Severe	Douglas fir	120	12	Douglas fir, red alder.
						Red alder	---	---	
						Bigleaf maple	---	---	
						Western hemlock	---	---	
						Western redcedar	---	---	
54 Hoffstadt	17F	Moderate	Moderate	Slight	Slight	Douglas fir	116	11	Douglas fir, western hemlock.
						Western hemlock	108	17	
						Western redcedar	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
55 Hoffstadt	17R	Severe	Moderate	Slight	Slight	Douglas fir	116	11	Douglas fir, western hemlock.
						Western hemlock	108	17	
						Western redcedar	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
56 Hood	11A	Slight	Slight	Slight	Severe	Douglas fir	112	11	Douglas fir, ponderosa pine, grand fir.
						Grand fir	---	---	
						Ponderosa pine	---	---	
57 Kinney	15A	Moderate	Slight	Slight	Severe	Douglas fir	117	11	Douglas fir, western hemlock, red alder.
						Red alder	---	---	
						Western hemlock	105	16	
						Western redcedar	---	---	
						Noble fir	---	---	
58 Kinney	16R	Severe	Slight	Slight	Severe	Douglas fir	117	11	Douglas fir, western hemlock, red alder.
						Red alder	---	---	
						Western hemlock	105	16	
						Western redcedar	---	---	
						Noble fir	---	---	
59 Kinney	8R	Severe	Slight	Slight	Severe	Douglas fir	94	8	Noble fir, Douglas fir, western hemlock.
						Western hemlock	---	---	
						Noble fir	---	---	
						Red alder	---	---	
						Western redcedar	---	---	
61 Lonestar	11A	Moderate	Slight	Slight	Moderate	Western hemlock	79	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	84	7	
						Pacific silver fir	84	7	
						Noble fir	---	---	
						Western redcedar	---	---	
						Western white pine	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
62 Lonestar	11R	Severe	Slight	Slight	Moderate	Western hemlock	79	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	84	7	
						Pacific silver fir	84	7	
						Noble fir	---	---	
						Western redcedar	---	---	
						Western white pine	---	---	
63 Lonestar	11R	Severe	Slight	Slight	Moderate	Western hemlock	79	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	84	7	
						Pacific silver fir	84	7	
						Noble fir	---	---	
						Western redcedar	---	---	
						Western white pine	---	---	
64 McBee	7W	Moderate	Slight	Slight	Severe	Douglas fir	90	7	Douglas fir, red alder.
						Black cottonwood	---	---	
						Red alder	---	---	
						Western redcedar	---	---	
						Western hemlock	---	---	
65 McDoug	10A	Moderate	Slight	Slight	Severe	Douglas fir	110	10	Douglas fir, red alder.
						Red alder	---	---	
						Black cottonwood	---	---	
						Western redcedar	---	---	
						Bigleaf maple	---	---	
66, 67 McElroy	9A	Moderate	Severe	Slight	Moderate	Douglas fir	100	9	Douglas fir, ponderosa pine, grand fir.
						Ponderosa pine	---	---	
						Grand fir	---	---	
						Oregon white oak	---	---	
						Bigleaf maple	---	---	
68 McElroy	9R	Severe	Severe	Slight	Moderate	Douglas fir	100	9	Douglas fir, ponderosa pine, grand fir.
						Ponderosa pine	---	---	
						Grand fir	---	---	
						Oregon white oak	---	---	
						Bigleaf maple	---	---	
69 McElroy	9X	Severe	Severe	Slight	Moderate	Douglas fir	100	9	Douglas fir, ponderosa pine.
						Ponderosa pine	---	---	
						Grand fir	---	---	
						Oregon white oak	---	---	
						Bigleaf maple	---	---	
70 Minniepeak	11F	Slight	Moderate	Moderate	Slight	Western hemlock	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	80	6	
						Noble fir	---	---	
						Western redcedar	---	---	
71 Minniepeak	11R	Moderate	Moderate	Moderate	Slight	Western hemlock	75	11	Noble fir, Douglas fir western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	80	6	
						Noble fir	---	---	
						Western redcedar	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
72-------------- Minniepeak	11R	Severe	Severe	Moderate	Moderate	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
73, 74---------- Mossyrock	13A	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir, red alder.
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
						Western redcedar----	---	---	
75, 76---------- Mountzion	16A	Moderate	Slight	Slight	Severe	Douglas fir---------	116	11	Douglas fir, red alder, grand fir, western hemlock.
						Grand fir-----------	---	---	
						Red alder-----------	---	---	
						Western hemlock-----	105	16	
						Bigleaf maple-------	---	---	
77-------------- Mountzion	16R	Severe	Slight	Slight	Severe	Douglas fir---------	116	11	Douglas fir, red alder, grand fir, western hemlock.
						Grand fir-----------	---	---	
						Red alder-----------	---	---	
						Western hemlock-----	105	16	
						Bigleaf maple-------	---	---	
78-------------- Pelee	11A	Moderate	Moderate	Slight	Slight	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
79, 80---------- Pelee	11R	Severe	Moderate	Slight	Slight	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
81**:									
Pelee----------	11R	Severe	Moderate	Slight	Slight	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
Rock outcrop.									
82-------------- Pilchuck	11W	Moderate	Moderate	Slight	Moderate	Douglas fir---------	114	11	Douglas fir, red alder.
						Red alder-----------	---	---	
						Western hemlock-----	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
						Black cottonwood----	---	---	
83-------------- Pillery	11W	Moderate	Moderate	Slight	Severe	Douglas fir---------	115	11	Douglas fir, red alder.
						Red alder-----------	---	---	
						Western redcedar----	---	---	
						Western hemlock-----	---	---	
						Black cottonwood----	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
84-------------- Pinchot	10A	Moderate	Slight	Moderate	Severe	Douglas fir---------	105	10	Douglas fir, western hemlock.
						Western hemlock-----	---	---	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
85-------------- Pinchot	10R	Severe	Slight	Moderate	Severe	Douglas fir---------	105	10	Douglas fir, western hemlock.
						Western hemlock-----	---	---	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
86-------------- Pinoty	11A	Moderate	Slight	Slight	Severe	Douglas fir---------	115	11	Douglas fir, western hemlock.
						Western hemlock-----	---	---	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
88-------------- Polepatch	7X	Severe	Severe	Severe	Slight	Western hemlock-----	60	7	Noble fir, Douglas fir, western hemlock.
						Pacific silver fir--	---	---	
						Douglas fir---------	---	---	
						Lodgepole pine------	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
89-------------- Polepatch	5X	Moderate	Severe	Severe	Slight	Western hemlock-----	50	5	Western hemlock.
						Pacific silver fir--	---	---	
						Subalpine fir-------	---	---	
						Lodgepole pine------	---	---	
						Noble fir-----------	---	---	
						Douglas fir---------	---	---	
91**: Rock outcrop.									
Cattcreek------	7R	Severe	Moderate	Moderate	Slight	Western hemlock-----	60	7	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
						Alaska cedar--------	---	---	
94-------------- Shoestring	11A	Moderate	Slight	Slight	Slight	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir---------	80	7	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
95-------------- Shoestring	11R	Severe	Slight	Slight	Slight	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir---------	80	7	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
96-------------- Sinnice	12F	Moderate	Moderate	Moderate	Slight	Western hemlock-----	80	12	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	85	7	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
97-------------- Sinnice	12R	Severe	Moderate	Moderate	Slight	Western hemlock-----	80	12	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	85	7	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
98-------------- Sinnice	12R	Severe	Moderate	Moderate	Slight	Western hemlock-----	80	12	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	85	7	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
99-------------- Sinnice	8F	Moderate	Severe	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Subalpine fir-------	---	---	
100------------- Sinnice	8R	Severe	Severe	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Subalpine fir-------	---	---	
101------------- Sinnice	8R	Severe	Severe	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Subalpine fir-------	---	---	
102**:									
Sinnice--------	8R	Severe	Severe	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Subalpine fir-------	---	---	
Rock outcrop.									
103, 104, 105--- Skamania	11A	Moderate	Slight	Slight	Severe	Douglas fir---------	114	11	Douglas fir, western hemlock, red alder.
						Western hemlock-----	---	---	
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Bigleaf maple-------	---	---	
106------------- Skamania	11R	Severe	Slight	Slight	Severe	Douglas fir---------	114	11	Douglas fir, western hemlock, red alder.
						Western hemlock-----	---	---	
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Bigleaf maple-------	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
107, 108-------- Skelida	12A	Moderate	Slight	Slight	Severe	Douglas fir---------	120	12	Douglas fir, western hemlock, red alder.
						Western hemlock-----	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
109, 110-------- Skoly	15F	Moderate	Slight	Slight	Severe	Western hemlock-----	100	15	Douglas fir, western hemlock, red alder.
						Douglas fir---------	111	10	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
						Western redcedar----	---	---	
111------------- Skoly	15R	Severe	Slight	Slight	Severe	Western hemlock-----	100	15	Douglas fir, western hemlock, red alder.
						Douglas fir---------	111	10	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
						Western redcedar----	---	---	
112**: Skoly----------	15F	Moderate	Slight	Slight	Severe	Western hemlock-----	100	15	Douglas fir, western hemlock, red alder.
						Douglas fir---------	111	10	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
						Western redcedar----	---	---	
Rock outcrop.									
113**: Skoly----------	15R	Severe	Slight	Slight	Severe	Western hemlock-----	100	15	Douglas fir, western hemlock, red alder.
						Douglas fir---------	111	10	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
						Western redcedar----	---	---	
Rock outcrop.									
114------------- St. Helens	14F	Moderate	Slight	Moderate	Slight	Western hemlock-----	90	14	Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir---------	102	9	
						Pacific silver fir--	---	---	
						Western redcedar----	---	---	
						Western white pine--	---	---	
115------------- St. Martin	11W	Moderate	Moderate	Severe	Severe	Douglas fir---------	114	11	Douglas fir, red alder.
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
116------------- St. Martin	11W	Moderate	Moderate	Severe	Severe	Douglas fir---------	114	11	Douglas fir, red alder.
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
117------------- St. Martin	11R	Severe	Moderate	Severe	Severe	Douglas fir---------	114	11	Douglas fir, red alder.
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
118------------- St. Martin	6W	Severe	Moderate	Severe	Severe	Douglas fir---------	80	6	Douglas fir, red alder.
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
119------------- Stabbart	10W	Severe	Moderate	Severe	Severe	Douglas fir---------	107	10	Douglas fir, red alder, grand fir.
						Grand fir-----------	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
						Western redcedar----	---	---	
120, 121-------- Stabler	14A	Moderate	Slight	Slight	Severe	Western hemlock-----	95	14	Douglas fir, western hemlock, grand fir.
						Douglas fir---------	106	10	
						Grand fir-----------	---	---	
						Red alder-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
122------------- Stabler	14R	Severe	Slight	Slight	Severe	Western hemlock-----	95	14	Douglas fir, western hemlock, grand fir.
						Douglas fir---------	106	10	
						Grand fir-----------	---	---	
						Red alder-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
123------------- Steever	14F	Moderate	Slight	Slight	Severe	Western hemlock-----	90	14	Douglas fir, western hemlock, red alder.
						Douglas fir---------	100	9	
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Bigleaf maple-------	---	---	
124------------- Steever	14R	Severe	Slight	Slight	Severe	Western hemlock-----	90	14	Douglas fir, western hemlock, red alder.
						Douglas fir---------	100	9	
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Bigleaf maple-------	---	---	
125**:									
Steever--------	14F	Moderate	Slight	Slight	Severe	Western hemlock-----	90	14	Douglas fir, western hemlock, red alder.
						Douglas fir---------	100	9	
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Bigleaf maple-------	---	---	
Rock outcrop.									
126**:									
Steever--------	14R	Severe	Slight	Slight	Severe	Western hemlock-----	90	14	Douglas fir, western hemlock, red alder.
						Douglas fir---------	100	9	
						Red alder-----------	---	---	
						Grand fir-----------	---	---	
						Bigleaf maple-------	---	---	
Rock outcrop.									

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
127, 128-------- Stevenson	16A	Moderate	Slight	Slight	Severe	Western hemlock-----	105	16	Douglas fir, western hemlock, grand fir.
						Douglas fir---------	114	11	
						Grand fir-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
						Red alder-----------	---	---	
129------------ Stevenson	14R	Severe	Slight	Slight	Severe	Douglas fir---------	100	9	Douglas fir, western hemlock, grand fir.
						Western hemlock-----	90	14	
						Grand fir-----------	---	---	
						Western redcedar----	---	---	
						Bigleaf maple-------	---	---	
						Red alder-----------	---	---	
130------------ Swift	12A	Moderate	Slight	Slight	Moderate	Western hemlock-----	83	12	Douglas fir, western hemlock.
						Douglas fir---------	96	9	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
131------------ Swift	12R	Severe	Slight	Slight	Moderate	Western hemlock-----	83	12	Douglas fir, western hemlock.
						Douglas fir---------	96	9	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
132------------ Swift	12R	Severe	Slight	Slight	Moderate	Western hemlock-----	83	12	Douglas fir, western hemlock.
						Douglas fir---------	96	9	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
133**:									
Swift----------	12R	Severe	Slight	Slight	Moderate	Western hemlock-----	83	12	Douglas fir, western hemlock.
						Douglas fir---------	96	9	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
Rock outcrop.									
134**:									
Swift----------	12R	Severe	Slight	Slight	Moderate	Western hemlock-----	83	12	Douglas fir, western hemlock.
						Douglas fir---------	96	9	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
Rock outcrop.									
135------------ Timberhead	9A	Moderate	Moderate	Slight	Slight	Douglas fir---------	92	9	Douglas fir.
136------------ Timberhead	9R	Severe	Moderate	Slight	Slight	Douglas fir---------	92	9	Douglas fir.

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
137------------- Tradedollar	8F	Moderate	Moderate	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	70	8	
						Noble fir-----------	---	---	
						Douglas fir---------	---	---	
						Western white pine--	---	---	
138, 139-------- Tradedollar	8R	Severe	Moderate	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	70	8	
						Noble fir-----------	---	---	
						Douglas fir---------	---	---	
						Western white pine--	---	---	
140------------- Tradedollar	13F	Moderate	Slight	Moderate	Slight	Western hemlock-----	85	13	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir---------	90	8	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
141------------- Tradedollar	13R	Severe	Slight	Moderate	Slight	Western hemlock-----	85	13	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir---------	90	8	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
142------------- Tradedollar	13R	Severe	Slight	Moderate	Slight	Western hemlock-----	85	13	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir---------	90	8	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
143------------- Typic Dystrandepts	10A	Severe	Moderate	Slight	Severe	Douglas fir---------	110	10	Douglas fir, noble fir, western hemlock.
						Western hemlock-----	---	---	
						Grand fir-----------	---	---	
						Western redcedar----	---	---	
144, 145-------- Underwood	11A	Moderate	Slight	Slight	Severe	Douglas fir---------	116	11	Douglas fir, ponderosa pine, grand fir.
						Ponderosa pine------	---	---	
						Grand fir-----------	---	---	
						Oregon white oak----	---	---	
						Bigleaf maple-------	---	---	
146------------- Underwood	11R	Severe	Slight	Slight	Severe	Douglas fir---------	116	11	Douglas fir, ponderosa pine, grand fir.
						Ponderosa pine------	---	---	
						Grand fir-----------	---	---	
						Oregon white oak----	---	---	
						Bigleaf maple-------	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
147------------- Undusk	8F	Moderate	Slight	Slight	Moderate	Douglas fir---------	88	8	Douglas fir, grand fir, western hemlock.
						Grand fir-----------	---	---	
						Western hemlock-----	---	---	
						Red alder-----------	---	---	
						Western redcedar----	---	---	
148------------- Undusk	8R	Severe	Slight	Slight	Moderate	Douglas fir---------	88	8	Douglas fir, grand fir, western hemlock.
						Grand fir-----------	---	---	
						Western hemlock-----	---	---	
						Red alder-----------	---	---	
						Western redcedar----	---	---	
149------------- Vanson	12A	Moderate	Slight	Slight	Slight	Western hemlock-----	78	12	Douglas fir, western hemlock, noble fir, Pacific silver fir.
						Douglas fir---------	77	6	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
150------------- Vanson	12R	Severe	Slight	Slight	Slight	Western hemlock-----	78	12	Douglas fir, western hemlock, noble fir, Pacific silver fir.
						Douglas fir---------	77	6	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
151------------- Vanson	12R	Severe	Slight	Slight	Slight	Western hemlock-----	78	12	Douglas fir, western hemlock, noble fir, Pacific silver fir.
						Douglas fir---------	77	6	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
152------------- Vanson	8A	Moderate	Slight	Slight	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Douglas fir---------	---	---	
						Subalpine fir-------	---	---	
153------------- Vanson	8R	Severe	Slight	Slight	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Douglas fir---------	---	---	
						Subalpine fir-------	---	---	
154**:									
Vanson---------	12R	Severe	Slight	Slight	Slight	Western hemlock-----	78	12	Douglas fir, western hemlock, noble fir, Pacific silver fir.
						Douglas fir---------	77	6	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
Rock outcrop.									
155**:									
Vanson---------	12R	Severe	Slight	Slight	Slight	Western hemlock-----	78	12	Douglas fir, western hemlock, noble fir, Pacific silver fir.
						Douglas fir---------	77	6	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
Rock outcrop.									

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
156**:									
Vanson	8R	Severe	Slight	Slight	Slight	Western hemlock	70	8	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Noble fir	---	---	
						Douglas fir	---	---	
						Subalpine fir	---	---	
Rock outcrop.									
157 Washougal	10F	Moderate	Slight	Slight	Severe	Douglas fir	114	10	Douglas fir, red alder.
						Red alder	---	---	
						Western hemlock	---	---	
						Western redcedar	---	---	
						Bigleaf maple	---	---	
158, 159 Washougal	12F	Moderate	Moderate	Slight	Moderate	Douglas fir	119	12	Douglas fir, red alder, grand fir.
						Red alder	---	---	
						Grand fir	---	---	
						Western hemlock	---	---	
						Bigleaf maple	---	---	
160 Washougal	12R	Severe	Moderate	Slight	Moderate	Douglas fir	119	12	Douglas fir, red alder, grand fir.
						Red alder	---	---	
						Grand fir	---	---	
						Western hemlock	---	---	
						Bigleaf maple	---	---	
162 Yalelake	17A	Moderate	Slight	Slight	Severe	Western hemlock	110	17	Douglas fir, western hemlock.
						Douglas fir	120	12	
						Bigleaf maple	---	---	
						Western redcedar	---	---	
						Bigleaf maple	---	---	
163 Yalelake	17R	Severe	Slight	Slight	Severe	Western hemlock	110	17	Douglas fir, western hemlock.
						Douglas fir	120	12	
						Bigleaf maple	---	---	
						Western redcedar	---	---	
						Bigleaf maple	---	---	
164 Yalelake	17R	Severe	Slight	Slight	Severe	Western hemlock	110	17	Douglas fir, western hemlock.
						Douglas fir	120	12	
						Bigleaf maple	---	---	
						Western redcedar	---	---	
						Bigleaf maple	---	---	
165 Zygore	10F	Slight	Slight	Slight	Moderate	Douglas fir	92	5	Douglas fir, western hemlock.
						Western hemlock	85	10	
						Red alder	---	---	
						Western redcedar	---	---	
166 Zygore	10R	Severe	Slight	Slight	Moderate	Douglas fir	92	5	Douglas fir, western hemlock.
						Western hemlock	85	10	
						Red alder	---	---	
						Western redcedar	---	---	
167**:									
Zygore	10R	Severe	Slight	Slight	Moderate	Douglas fir	92	5	Douglas fir, western hemlock.
						Western hemlock	85	10	
						Red alder	---	---	
						Western redcedar	---	---	

See footnotes at end of table.

TABLE 6A.--WOODLAND MANAGEMENT AND PRODUCTIVITY (PREERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
167**: Rock outcrop.									
168 Zymer	17A	Moderate	Moderate	Slight	Severe	Western hemlock	110	17	Douglas fir, western hemlock.
						Douglas fir	125	12	
						Western redcedar	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
169 Zymer	17R	Severe	Moderate	Slight	Severe	Western hemlock	110	17	Douglas fir, western hemlock.
						Douglas fir	125	12	
						Western redcedar	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
170 Zymer	17R	Severe	Moderate	Slight	Severe	Western hemlock	110	17	Douglas fir, western hemlock.
						Douglas fir	125	12	
						Western redcedar	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
171**: Zymer	17R	Severe	Moderate	Slight	Severe	Western hemlock	110	17	Douglas fir, western hemlock.
						Douglas fir	125	12	
						Western redcedar	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
Rock outcrop.									
172**: Zymer	17R	Severe	Moderate	Slight	Severe	Western hemlock	110	17	Douglas fir, western hemlock.
						Douglas fir	125	12	
						Western redcedar	---	---	
						Red alder	---	---	
						Bigleaf maple	---	---	
Rock outcrop.									
173 Zynbar	17A	Moderate	Slight	Slight	Moderate	Douglas fir	123	12	Douglas fir, western hemlock.
						Western hemlock	110	17	
						Red alder	---	---	
						Western redcedar	---	---	
						Bigleaf maple	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6B.--WOODLAND MANAGEMENT AND PRODUCTIVITY (POSTERUPTION)

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
200 Bandid	12F	Moderate	Severe	Slight	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock.
						Douglas fir	85	7	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
201, 202 Bandid	12R	Severe	Severe	Slight	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock.
						Douglas fir	85	7	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
203, 204 Cattcreek	7R	Severe	Severe	Moderate	Slight	Western hemlock	60	7	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	---	---	
						Noble fir	---	---	
						Western white pine	---	---	
						Alaska cedar	---	---	
205 Cinnamon	14S	Moderate	Severe	Slight	Slight	Western hemlock	96	14	Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	106	11	
						Pacific silver fir	---	---	
						Western redcedar	---	---	
						Red alder	---	---	
206 Colter	12S	Moderate	Severe	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	90	8	
						Western redcedar	---	---	
						Noble fir	---	---	
207, 208 Colter	12R	Severe	Severe	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	90	8	
						Western redcedar	---	---	
						Noble fir	---	---	
209 Colter	7S	Severe	Severe	Moderate	Slight	Western hemlock	65	7	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	---	---	
						Noble fir	---	---	
						Western white pine	---	---	
						Alaska cedar	---	---	
210, 211 Colter	7R	Severe	Severe	Moderate	Slight	Western hemlock	65	7	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	---	---	
						Noble fir	---	---	
						Western white pine	---	---	
						Alaska cedar	---	---	

See footnotes at end of table.

TABLE 6B.--WOODLAND MANAGEMENT AND PRODUCTIVITY (POSTERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
212------------- Colter	12R	Severe	Severe	Moderate	Slight	Western hemlock-----	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Subalpine fir-------	---	---	
						Douglas fir---------	90	8	
						Western redcedar----	---	---	
213**:									
Colter---------	7R	Severe	Severe	Moderate	Slight	Western hemlock-----	65	7	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	---	---	
						Noble fir-----------	---	---	
						Western white pine--	---	---	
						Alaska cedar--------	---	---	
Rock outcrop.									
215------------- Elkprairie	---	Moderate	Severe	Moderate	Slight	Lodgepole pine------	---	---	Lodgepole pine.
216------------- Hatchet	12R	Severe	Severe	Moderate	Slight	Western hemlock-----	81	12	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir---------	94	9	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
217, 218-------- Hatchet	7R	Severe	Severe	Moderate	Slight	Western hemlock-----	60	7	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
						Pacific silver fir--	---	---	
						Subalpine fir-------	---	---	
						Noble fir-----------	---	---	
						Douglas fir---------	---	---	
219**:									
Hatchet--------	12R	Severe	Severe	Moderate	Slight	Western hemlock-----	81	12	Noble fir, Douglas fir, western hemlock.
						Douglas fir---------	94	9	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
Rock outcrop.									
220**, 221**:									
Hatchet--------	7R	Severe	Severe	Moderate	Slight	Western hemlock-----	60	7	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
						Pacific silver fir--	---	---	
						Subalpine fir-------	---	---	
						Noble fir-----------	---	---	
						Douglas fir---------	---	---	
Rock outcrop.									
223------------- Lonestar	11S	Moderate	Severe	Slight	Slight	Western hemlock-----	79	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	84	7	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	

See footnotes at end of table.

TABLE 6B.--WOODLAND MANAGEMENT AND PRODUCTIVITY (POSTERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
224, 225-------- Lonestar	11R	Severe	Severe	Slight	Slight	Western hemlock-----	79	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	84	7	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
226------------- Minniepeak	11S	Moderate	Severe	Moderate	Slight	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
227------------- Minniepeak	11R	Severe	Severe	Moderate	Slight	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
228------------- Minniepeak	11R	Severe	Severe	Moderate	Moderate	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
229------------- Minniepeak	11R	Severe	Severe	Moderate	Moderate	Western hemlock-----	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
232------------- Pelee	11F	Moderate	Severe	Slight	Slight	Western hemlock-----	75	11	Pacific silver fir, noble fir, Douglas fir, western hemlock.
						Noble fir-----------	---	---	
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Western redcedar----	---	---	
233, 234-------- Pelee	11R	Severe	Severe	Slight	Slight	Western hemlock-----	75	11	Pacific silver fir, noble fir, Douglas fir, western hemlock.
						Noble fir-----------	---	---	
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Western redcedar----	---	---	
235**:									
Pelee----------	11R	Severe	Severe	Slight	Slight	Western hemlock-----	75	11	Pacific silver fir, noble fir, Douglas fir, western hemlock.
						Noble fir-----------	---	---	
						Pacific silver fir--	---	---	
						Douglas fir---------	80	6	
						Western redcedar----	---	---	
Rock outcrop.									

See footnotes at end of table.

TABLE 6B.--WOODLAND MANAGEMENT AND PRODUCTIVITY (POSTERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
236 Polepatch	7X	Severe	Severe	Severe	Slight	Western hemlock	60	7	Noble fir, Douglas fir, western hemlock.
						Pacific silver fir	---	---	
						Douglas fir	---	---	
						Noble fir	---	---	
						Lodgepole pine	---	---	
						Western white pine	---	---	
237**: Rock outcrop.									
Cattcreek	13R	Severe	Severe	Moderate	Slight	Western hemlock	86	13	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Noble fir	---	---	
						Subalpine fir	---	---	
						Douglas fir	90	9	
238 Shoestring	11S	Moderate	Severe	Slight	Slight	Western hemlock	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	80	7	
						Pacific silver fir	---	---	
						Noble fir	---	---	
						Western white pine	---	---	
239 Shoestring	11R	Severe	Severe	Slight	Slight	Western hemlock	75	11	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir	80	7	
						Pacific silver fir	---	---	
						Noble fir	---	---	
						Western white pine	---	---	
240 Sinnice	12F	Severe	Severe	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	85	7	
						Noble fir	---	---	
						Western redcedar	---	---	
241, 242 Sinnice	12R	Severe	Severe	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	85	7	
						Noble fir	---	---	
						Western redcedar	---	---	
243 Sinnice	12F	Severe	Severe	Moderate	Slight	Western hemlock	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir	---	---	
						Douglas fir	85	7	
						Noble fir	---	---	
						Western redcedar	---	---	
244, 245 Sinnice	8R	Severe	Severe	Moderate	Slight	Western hemlock	70	8	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
						Pacific silver fir	---	---	
						Noble fir	---	---	
						Subalpine fir	---	---	

See footnotes at end of table.

TABLE 6B.--WOODLAND MANAGEMENT AND PRODUCTIVITY (POSTERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
246**:									
Sinnice--------	12R	Severe	Severe	Moderate	Slight	Western hemlock-----	80	12	Douglas fir, noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Douglas fir---------	85	7	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
Rock outcrop.									
247**:									
Sinnice--------	8R	Severe	Severe	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir, subalpine fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Subalpine fir-------	---	---	
Rock outcrop.									
249------------- Swift	12S	Moderate	Severe	Slight	Slight	Douglas fir---------	96	9	Douglas fir, western hemlock.
						Western hemlock-----	83	12	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
250**:									
Swift----------	12R	Severe	Severe	Slight	Slight	Douglas fir---------	96	9	Douglas fir, western hemlock.
						Western hemlock-----	83	12	
						Western redcedar----	---	---	
						Red alder-----------	---	---	
						Bigleaf maple-------	---	---	
Rock outcrop.									
251------------- Tradedollar	8S	Severe	Severe	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir, Douglas fir.
						Douglas fir---------	---	---	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
252, 253-------- Tradedollar	8R	Severe	Severe	Moderate	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir, Douglas fir.
						Douglas fir---------	---	---	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	
254------------- Tradedollar	13S	Moderate	Severe	Moderate	Slight	Western hemlock-----	85	13	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
						Douglas fir---------	90	8	
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Western redcedar----	---	---	

See footnotes at end of table.

TABLE 6B.--WOODLAND MANAGEMENT AND PRODUCTIVITY (POSTERUPTION)--Continued

oil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
55, 256-------- radedollar	13R	Severe	Severe	Moderate	Slight	Western hemlock----- Douglas fir--------- Pacific silver fir-- Noble fir----------- Western redcedar----	85 90 --- --- ---	13 8 --- --- ---	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
7------------ anson	12S	Moderate	Severe	Slight	Slight	Western hemlock----- Douglas fir--------- Pacific silver fir-- Noble fir----------- Western white pine--	78 77 --- --- ---	12 6 --- --- ---	Douglas fir, western hemlock, noble fir, Pacific silver fir.
58, 259-------- anson	12R	Severe	Severe	Slight	Slight	Western hemlock----- Douglas fir--------- Pacific silver fir-- Noble fir----------- Western white pine--	78 77 --- --- ---	12 6 --- --- ---	Douglas fir, western hemlock, noble fir, Pacific silver fir.
0------------ anson	8S	Severe	Severe	Slight	Slight	Western hemlock----- Pacific silver fir-- Noble fir----------- Douglas fir--------- Subalpine fir-------	70 --- --- --- ---	8 --- --- --- ---	Noble fir, western hemlock, Pacific silver fir.
1------------ anson	8R	Severe	Severe	Slight	Slight	Western hemlock----- Pacific silver fir-- Noble fir----------- Douglas fir--------- Subalpine fir-------	70 --- --- --- ---	8 --- --- --- ---	Noble fir, western hemlock, Pacific silver fir.
2------------ anson	12R	Severe	Severe	Slight	Slight	Western hemlock----- Douglas fir--------- Pacific silver fir-- Noble fir-----------	78 77 --- ---	12 6 --- ---	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
3**: anson---------	12R	Severe	Severe	Slight	Slight	Western hemlock----- Douglas fir--------- Pacific silver fir-- Noble fir-----------	78 77 --- ---	12 6 --- ---	Noble fir, Douglas fir, western hemlock, Pacific silver fir.
ock outcrop.									
4**: anson---------	12R	Severe	Severe	Slight	Slight	Western hemlock----- Douglas fir--------- Pacific silver fir-- Noble fir----------- Western white pine--	78 77 --- --- ---	12 6 --- --- ---	Douglas fir, western hemlock, noble fir, Pacific silver fir.
ock outcrop.									

See footnotes at end of table.

TABLE 6B.--WOODLAND MANAGEMENT AND PRODUCTIVITY (POSTERUPTION)--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
265**:									
Vanson---------	8R	Severe	Severe	Slight	Slight	Western hemlock-----	70	8	Noble fir, western hemlock, Pacific silver fir.
						Pacific silver fir--	---	---	
						Noble fir-----------	---	---	
						Douglas fir---------	---	---	
						Subalpine fir-------	---	---	
Rock outcrop.									

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1 Andic Cryumbrepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
2 Arents	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: droughty.
3 Aschoff	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
4 Aschoff	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
5*:					
Aschoff	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
6* Badland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
7, 8 Bandid	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
9 Bandid	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
10, 11 Bandid	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
12 Bannel	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
13, 14 Bannel	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
15 Benham	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
16 Benham	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
17 Bonneville	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.	Severe: droughty.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
18, 19, 20 Cattcreek	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
21 Chemawa	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
22 Chemawa	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
23 Chemawa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
24 Chemawa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
25 Cinnamon	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
26, 27 Cinnamon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
28 Colter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
29, 30 Colter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
31 Colter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
32, 33 Colter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
34*:					
Colter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
35 Cryandepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
36 Dougan	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
37 Dougan	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
38 Forsyth	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
39 Forsyth	Severe: slope.	Severe: slope.	Severe: large stones.	Moderate: too sandy, slope.	Moderate: small stones, large stones.
40 Forsyth	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: too sandy, slope.	Moderate: small stones, large stones.
41 Fortran	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
42 Haplumbrepts	Severe: wetness.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness.	Moderate: small stones, wetness, droughty.
43, 44, 45, 46 Hatchet	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
47*, 48*, 49*: Hatchet	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
50 Hesson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
51 Hesson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
52 Hesson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
53 Histic Cryaquepts	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
54 Hoffstadt	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, droughty, slope.
55 Hoffstadt	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, droughty, slope.
56 Hood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
57 Kinney	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
58, 59 Kinney	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
60 Lithic Umbric Vitrandepts	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: droughty, depth to rock.
61 Lonestar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
62, 63 Lonestar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
64 McBee	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
65 McDoug	Severe: flooding.	Slight	Slight	Slight	Slight.
66 McElroy	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.	Moderate: small stones, droughty, slope.
67 McElroy	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope.
68 McElroy	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
69 McElroy	Moderate: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: dusty.	Severe: droughty.
70 Minniepeak	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: droughty, slope.
71, 72 Minniepeak	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
73 Mossyrock	Slight	Slight	Moderate: slope.	Slight	Slight.
74 Mossyrock	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
75 Mountzion	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
76 Mountzion	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
77 Mountzion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
78 Pelee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
79, 80 Pelee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
81*:					
Pelee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
82 Pilchuck	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight	Moderate: droughty, flooding.
83 Pillery	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
84 Pinchot	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
85 Pinchot	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
86 Pinoty	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
87* Pits	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty, too sandy.
88, 89 Polepatch	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, too sandy, slope.	Severe: small stones, large stones, droughty.
90* Riverwash	Severe: flooding, wetness.	Severe: wetness, too sandy.	Severe: small stones, too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
91*:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
Cattcreek	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
92*:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
Rubble land	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: small stones, large stones, droughty.
93*:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
Xerorthents	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
94 Shoestring	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
95 Shoestring	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
96 Sinnice	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
97, 98 Sinnice	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
99 Sinnice	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
100, 101 Sinnice	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
102*:					
Sinnice	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
103 Skamania	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.
104 Skamania	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
105 Skamania	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
6----------------- kamania	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
7----------------- kelida	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
8----------------- kelida	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
9----------------- koly	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, large stones, slope.
0----------------- koly	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
1----------------- koly	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
2*: koly---------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
ock outcrop---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: depth to rock.
3*: koly---------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
ock outcrop---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
4----------------- . Helens	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
5----------------- . Martin	Severe: wetness.	Moderate: slope, wetness, small stones.	Severe: slope, small stones, wetness.	Moderate: wetness.	Moderate: small stones, wetness, slope.
6----------------- . Martin	Severe: slope, wetness.	Severe: slope.	Severe: slope, small stones, wetness.	Moderate: wetness, slope.	Severe: slope.
7----------------- . Martin	Severe: slope, wetness.	Severe: slope.	Severe: slope, small stones, wetness.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
118------------------- St. Martin	Severe: slope, wetness.	Severe: slope.	Severe: slope, small stones, wetness.	Moderate: wetness, slope.	Severe: slope.
119------------------- Stabbart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
120------------------- Stabler	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
121------------------- Stabler	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
122------------------- Stabler	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
123------------------- Steever	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
124------------------- Steever	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
125*:					
Steever--------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Rock outcrop---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: depth to rock.
126*:					
Steever--------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
127------------------- Stevenson	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
128------------------- Stevenson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
129------------------- Stevenson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
130------------------- Swift	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
131, 132-------------- Swift	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
133*, 134*:					
Swift	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
135 Timberhead	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope.
136 Timberhead	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
137 Tradedollar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
138, 139 Tradedollar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
140 Tradedollar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
141, 142 Tradedollar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
143 Typic Dystrandepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
144 Underwood	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
145 Underwood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
146 Underwood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
147 Undusk	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
148 Undusk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
149 Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
150, 151 Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
152 Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
153 Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
154*, 155*, 156*:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
157 Washougal	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: droughty.
158 Washougal	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.	Moderate: small stones, droughty.
159 Washougal	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope.
160 Washougal	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
161*:					
Xerorthents	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
162 Yalelake	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
163, 164 Yalelake	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
165 Zygore	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
166 Zygore	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
167*:					
Zygore	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
168 Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
169, 170 Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7A.--RECREATIONAL DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
171*, 172*:					
Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
173 Zynbar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7B.--RECREATIONAL DEVELOPMENT (POSTERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
200------------------- Bandid	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders.	Severe: cinders, slope.
201, 202-------------- Bandid	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.
203, 204-------------- Cattcreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
205------------------- Cinnamon	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
206------------------- Colter	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
207, 208-------------- Colter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
209------------------- Colter	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
210, 211-------------- Colter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
212------------------- Colter	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.
213*:					
Colter---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
214------------------- Cryandepts	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, droughty, slope.
215------------------- Elkprairie	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too sandy, slope.	Severe: slope.
216, 217, 218--------- Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
219*:					
Hatchet--------------	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, droughty, slope.

See footnote at end of table.

TABLE 7B.--RECREATIONAL DEVELOPMENT (POSTERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
9*:					
ock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
0*:					
atchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
ock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
1*:					
atchet	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, droughty, slope.
ock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
2 istic Cryaquepts	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3 onestar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
4, 225 onestar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
6 innniepeak	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
7 innniepeak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
8, 229 innniepeak	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, droughty, slope.
0 bscurity	Severe: flooding, slope, too sandy.	Severe: slope, too sandy.	Severe: large stones, slope, small stones.	Severe: too sandy.	Severe: droughty, slope.
1 anhandle	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
2 elee	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders.	Severe: cinders, slope.
3, 234 elee	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.

See footnote at end of table.

TABLE 7B.--RECREATIONAL DEVELOPMENT (POSTERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
235*:					
Pelee	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
236 Polepatch	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too sandy, slope.	Severe: droughty, slope.
237*:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
Cattcreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
238 Shoestring	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
239 Shoestring	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
240 Sinnice	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders.	Severe: cinders, slope.
241, 242 Sinnice	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.
243 Sinnice	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders.	Severe: cinders, slope.
244, 245 Sinnice	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.
246*:					
Sinnice	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
247*:					
Sinnice	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.

See footnote at end of table.

TABLE 7B.--RECREATIONAL DEVELOPMENT (POSTERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
248*------------------- Studebaker	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: too sandy.	Severe: small stones, droughty.
249------------------- Swift	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
250*:					
Swift-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
251------------------- Tradedollar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
252, 253-------------- Tradedollar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
254------------------- Tradedollar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
255, 256-------------- Tradedollar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
257------------------- Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
258, 259-------------- Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
260------------------- Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
261------------------- Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
262------------------- Vanson	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.
263*:					
Vanson----------------	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.
Rock outcrop----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
264*:					
Vanson----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.

See footnote at end of table.

TABLE 7B.--RECREATIONAL DEVELOPMENT (POSTERUPTION)--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
265*:					
Vanson	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: slope, cinders.	Severe: cinders, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
266 Wakepish	Severe: flooding, slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones, flooding.	Severe: small stones.	Severe: small stones, droughty, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated. Only preeruption soils are listed in this table because posteruption soils are not suited to wildlife habitat)

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1------------------ Andic Cryumbrepts	Poor	Poor	Fair	Poor	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	---
2------------------ Arents	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	---
3------------------ Aschoff	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
4------------------ Aschoff	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	---	---
5*:												
Aschoff-----------	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	---	---
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
6*----------------- Badland	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
7------------------ Bandid	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
8------------------ Bandid	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
9------------------ Bandid	Fair	Good	Good	Fair	Fair	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
10----------------- Bandid	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
11----------------- Bandid	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
12----------------- Bannel	Fair	Good	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
13----------------- Bannel	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
14----------------- Bannel	Very poor.	Very poor.	Good	Fair	Good	Good	Poor	Very poor.	Poor	Good	Very poor.	---
15, 16------------- Benham	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
17----------------- Bonneville	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	---
18----------------- Cattcreek	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
19 Cattcreek	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
20 Cattcreek	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
21 Chemawa	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
22, 23 Chemawa	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
24 Chemawa	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
25 Cinnamon	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
26 Cinnamon	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
27 Cinnamon	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
28, 29 Colter	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
30 Colter	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
31, 32, 33 Colter	Very poor.	Very poor.	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
34*:												
Colter	Very poor.	Very poor.	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
35 Cryandepts	Very poor.	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
36, 37 Dougan	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	---
38 Forsyth	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
39, 40 Forsyth	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
41 Fortran	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.	---
42 Haplumbrepts	Fair	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Fair	Fair	Good.
43 Hatchet	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
44 Hatchet	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
45 Hatchet	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	---
46 Hatchet	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	---
47*:												
Hatchet	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
48*:												
Hatchet	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
49*:												
Hatchet	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
50, 51 Hesson	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
52 Hesson	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
53 Histic Cryaquepts	Poor	Poor	Poor	Poor	Fair	Good	Good	Poor	Poor	Poor	Fair	Fair.
54, 55 Hoffstadt	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
56 Hood	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
57 Kinney	Poor	Poor	Good	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.	---
58, 59 Kinney	Very poor.	Very poor.	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.	---
60 Lithic Umbric Vitrandepts	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
61, 62 Lonestar	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
63----------------- Lonestar	Very poor.	Very poor.	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.	---
64----------------- McBee	Fair	Fair	Good	Good	Good	Good	Good	Fair	Fair	Good	Fair	---
65----------------- McDoug	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
66, 67------------- McElroy	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	---
68----------------- McElroy	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
69----------------- McElroy	Poor	Poor	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
70, 71------------- Minniepeak	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
72----------------- Minniepeak	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
73, 74------------- Mossyrock	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
75----------------- Mountzion	Fair	Good	Good	---	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
76----------------- Mountzion	Poor	Fair	Good	---	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
77----------------- Mountzion	Very poor.	Poor	Good	---	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
78, 79------------- Pelee	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Fair	Good	Very poor.	---
80----------------- Pelee	Very poor.	Very poor.	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.	---
81*:												
Pelee--------------	Very poor.	Very poor.	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.	---
Rock outcrop-------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
82----------------- Pilchuck	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
83----------------- Pillery	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
84----------------- Pinchot	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Fair	Good	Very poor.	---
85----------------- Pinchot	Very poor.	Very poor.	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
86----------------- Pinoty	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
87*----------------- Pits	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
88, 89------------- Polepatch	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	---
90*----------------- Riverwash	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.
91*:												
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Cattcreek---------	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
92*:												
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Rubble land-------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
93*:												
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Xerorthents-------	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
94----------------- Shoestring	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.	---
95----------------- Shoestring	Very poor.	Very poor.	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.	---
96, 97------------- Sinnice	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
98----------------- Sinnice	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
99, 100------------ Sinnice	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
101---------------- Sinnice	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
102*:												
Sinnice-----------	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
103---------------- Skamania	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
104, 105----------- Skamania	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
106---------------- Skamania	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
107, 108----------- Skelida	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
109, 110----------- Skoly	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
111---------------- Skoly	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
112*:												
Skoly--------------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
113*:												
Skoly--------------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
114---------------- St. Helens	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
115---------------- St. Martin	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
116---------------- St. Martin	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
117---------------- St. Martin	Very poor.	Very poor.	Good	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.	---
118---------------- St. Martin	Poor	Fair	Good	Good	Fair	Good	Poor	Very poor.	Fair	Good	Very poor.	---
119---------------- Stabbart	Poor	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair	---
120---------------- Stabler	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
121---------------- Stabler	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
122---------------- Stabler	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
123, 124----------- Steever	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
125*, 126*: Steever	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
127, 128 Stevenson	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
129 Stevenson	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
130 Swift	Fair	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
131 Swift	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
132 Swift	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
133*: Swift	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
134*: Swift	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
135, 136 Timberhead	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
137, 138, 139 Tradedollar	Very poor.	Very poor.	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
140, 141 Tradedollar	Poor	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
142 Tradedollar	Very poor.	Very poor.	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
143 Typic Dystrandepts	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
144, 145 Underwood	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
146 Underwood	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
147, 148 Undusk	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
149, 150 Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
151 Vanson	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
152 Vanson	Very poor.	Very poor.	Good	Poor	Poor	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
153 Vanson	Very poor.	Very poor.	Good	Poor	Poor	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
154*: Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
155*: Vanson	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
156*: Vanson	Very poor.	Very poor.	Good	Poor	Poor	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
157 Washougal	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
158, 159 Washougal	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
160 Washougal	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
161*: Xerorthents	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
162 Yalelake	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
163 Yalelake	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
164 Yalelake	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
165 Zygore	Fair	Good	Good	Fair	Fair	Good	Very poor.	Very poor.	Good	Good	Very poor.	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT (PREERUPTION)--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
166 Zygore	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
167*:												
Zygore	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
168 Zymer	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
169 Zymer	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
170 Zymer	Very poor.	Very poor.	Good	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.	---
171*:												
Zymer	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
172*:												
Zymer	Very poor.	Very poor.	Good	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.	---
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
173 Zynbar	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9A.--BUILDING SITE DEVELOPMENT (PREERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1 Andic Cryumbrepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
2 Arents	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Severe: droughty.
3, 4 Aschoff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
5*:						
Aschoff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
6* Badland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
7, 8, 9, 10, 11 Bandid	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12, 13, 14 Bannel	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
15, 16 Benham	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: cinders, slope.
17 Bonneville	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, large stones.	Severe: droughty.
18, 19, 20 Cattcreek	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
21 Chemawa	Slight	Slight	Slight	Moderate: slope.	Severe: frost action.	Slight.
22 Chemawa	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
23, 24 Chemawa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.

See footnote at end of table.

TABLE 9A.--BUILDING SITE DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
25, 26, 27 Cinnamon	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
28, 29, 30, 31, 32, 33 Colter	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
34*:						
Colter	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
35 Cryandepts	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
36, 37 Dougan	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
38 Forsyth	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
39, 40 Forsyth	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: small stones, large stones.
41 Fortran	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
42 Haplumbrepts	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: small stones, wetness, droughty.
43, 44, 45, 46 Hatchet	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, frost action.	Severe: droughty, slope.
47*, 48*, 49*:						
Hatchet	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, frost action.	Severe: droughty, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
50 Hesson	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.

See footnote at end of table.

TABLE 9A.--BUILDING SITE DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
51, 52------------ Hesson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
53---------------- Histic Cryaquepts	Severe: cutbanks cave, excess humus, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, excess humus
54, 55------------ Hoffstadt	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, frost action, large stones.	Severe: small stones droughty, slope.
56---------------- Hood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
57, 58, 59-------- Kinney	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
60---------------- Lithic Umbric Vitrandepts	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: droughty, depth to roc
61, 62, 63-------- Lonestar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
64---------------- McBee	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
65---------------- McDoug	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: frost action.	Slight.
66---------------- McElroy	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones droughty, slope.
67, 68------------ McElroy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
69---------------- McElroy	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: droughty.
70, 71, 72-------- Minniepeak	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
73---------------- Mossyrock	Slight---------	Slight---------	Slight---------	Slight---------	Severe: low strength.	Slight.
74---------------- Mossyrock	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
75---------------- Mountzion	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.

See footnote at end of table.

TABLE 9A.--BUILDING SITE DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
6, 77 Mountzion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
8, 79, 80 Pelee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
1*: Pelee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
2 Pilchuck	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
3 Pillery	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
4, 85 Pinchot	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
6 Pinoty	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
7* Pits	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too sandy.
8, 89 Polepatch	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, large stones, droughty.
0* Riverwash	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty.
1*: Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Cattcreek	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
2*: Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.

See footnote at end of table.

TABLE 9A.--BUILDING SITE DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns a landscap
92*:						
Rubble land	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small ston large ston droughty.
93*:						
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to r
Xerorthents	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to r
94, 95 Shoestring	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
96, 97, 98, 99, 100, 101 Sinnice	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
102*:						
Sinnice	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to r
103 Skamania	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Severe: frost action.	Slight.
104 Skamania	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
105, 106 Skamania	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
107 Skelida	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
108 Skelida	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
109 Skoly	Moderate: large stones, slope.	Moderate: shrink-swell, slope, large stones.	Moderate: slope, shrink-swell, large stones.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: small ston large ston slope.
110, 111 Skoly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
112*, 113*:						
Skoly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9A.--BUILDING SITE DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
112*, 113*:						
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
114-------------- St. Helens	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
115-------------- St. Martin	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: small stones, wetness, slope.
116, 117, 118----- St. Martin	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
119-------------- Stabbart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
120-------------- Stabler	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: frost action.	Slight.
121, 122---------- Stabler	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
123, 124---------- Steever	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
125*, 126*:						
Steever----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
127-------------- Stevenson	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
128, 129---------- Stevenson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
130, 131, 132----- Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
133*, 134*:						
Swift------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.

See footnote at end of table.

TABLE 9A.--BUILDING SITE DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscapin
135, 136---------- Timberhead	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
137, 138, 139, 140, 141, 142---- Tradedollar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
143--------------- Typic Dystrandepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
144--------------- Underwood	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
145, 146---------- Underwood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
147, 148---------- Undusk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
149, 150, 151, 152, 153--------- Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
154*, 155*, 156*:						
Vanson-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to r
157--------------- Washougal	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: droughty.
158--------------- Washougal	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small ston droughty.
159, 160---------- Washougal	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
161*:						
Xerorthents------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to r
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to r

See footnote at end of table.

TABLE 9A.--BUILDING SITE DEVELOPMENT (PREERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
162, 163, 164----- Yalelake	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
165, 166---------- Zygore	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
167*:						
Zygore------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
168, 169, 170----- Zymer	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
171*, 172*:						
Zymer-------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
173--------------- Zynbar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9B.--BUILDING SITE DEVELOPMENT (POSTERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
200, 201, 202 Bandid	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
203, 204 Cattcreek	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
205 Cinnamon	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
206, 207, 208, 209, 210, 211 Colter	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
212 Colter	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
213*:						
Colter	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to roc
214 Cryandepts	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, droughty, slope.
215 Elkprairie	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
216, 217, 218 Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: droughty, slope.
219*:						
Hatchet	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: cinders, droughty, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to roc

See footnote at end of table.

TABLE 9B.--BUILDING SITE DEVELOPMENT (POSTERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
220*:						
Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: droughty, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
221*:						
Hatchet	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: cinders, droughty, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
222 Histic Cryaquepts	Severe: cutbanks cave, excess humus, wetness.	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, frost action.	Severe: wetness.
223, 224, 225 Lonestar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
226, 227 Minniepeak	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
228, 229 Minniepeak	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty, slope.
230 Obscurity	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope.	Severe: droughty, slope.
231 Panhandle	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: cinders.
232, 233, 234 Pelee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
235*:						
Pelee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.

See footnote at end of table.

TABLE 9B.--BUILDING SITE DEVELOPMENT (POSTERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
236--------------- Polepatch	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
237*:						
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock
Cattcreek--------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
238, 239---------- Shoestring	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
240, 241, 242, 243, 244, 245---- Sinnice	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
246*:						
Sinnice----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: cinders, slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock
247*:						
Sinnice----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock
248*-------------- Studebaker	Severe: cutbanks cave.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: small stones, droughty.
249--------------- Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
250*:						
Swift------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock
251, 252, 253, 254, 255, 256---- Tradedollar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9B.--BUILDING SITE DEVELOPMENT (POSTERUPTION)--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
257, 258, 259, 260, 261--------- Vanson	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
262--------------- Vanson	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: cinders, slope.
263*:						
Vanson-----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: cinders, slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
264*:						
Vanson-----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
265*:						
Vanson-----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: cinders, slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
266--------------- Wakepish	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope, flooding.	Severe: small stones, droughty, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10A.--SANITARY FACILITIES (PREERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1------------------- Andic Cryumbrepts	Severe: slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
2------------------- Arents	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
3, 4---------------- Aschoff	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: small stones, slope.
5*:					
Aschoff------------	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: small stones, slope.
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
6*------------------ Badland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
7, 8---------------- Bandid	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
9, 10, 11----------- Bandid	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope.
12, 13, 14---------- Bannel	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
15, 16-------------- Benham	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
17------------------ Bonneville	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy, large stones.	Severe: seepage.	Poor: seepage, too sandy, small stones.
18, 19, 20---------- Cattcreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: seepage, cinders, slope.

See footnote at end of table.

TABLE 10A.--SANITARY FACILITIES (PREERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21------------------- Chemawa	Slight-----------	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
22------------------- Chemawa	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
23, 24-------------- Chemawa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
25, 26, 27---------- Cinnamon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
28, 29, 30, 31, 32, 33----------------- Colter	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
34*:					
Colter--------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
35------------------- Cryandepts	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, too sandy.	Severe: slope.	Poor: too sandy, cinders, slope.
36, 37-------------- Dougan	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
38, 39, 40---------- Forsyth	Severe: poor filter, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
41------------------- Fortran	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
42------------------- Haplumbrepts	Severe: wetness.	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness.	Poor: seepage, small stones, wetness.
43, 44, 45, 46------ Hatchet	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.

See footnote at end of table.

TABLE 10A.--SANITARY FACILITIES (PREERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
47*, 48*, 49*:					
Hatchet	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
50 Hesson	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
51, 52 Hesson	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
53 Histic Cryaquepts	Severe: wetness, poor filter.	Severe: seepage, excess humus, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
54, 55 Hoffstadt	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: seepage, large stones, slope.
56 Hood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
57, 58, 59 Kinney	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
60 Lithic Umbric Vitrandepts	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock.
61, 62, 63 Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
64 McBee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
65 McDoug	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
66 McElroy	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
67, 68 McElroy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
69 McElroy	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.

See footnote at end of table.

TABLE 10A.--SANITARY FACILITIES (PREERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
70, 71, 72 Minniepeak	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
73 Mossyrock	Slight	Moderate: seepage, slope, excess humus.	Slight	Slight	Poor: hard to pack.
74 Mossyrock	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: hard to pack.
75 Mountzion	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
76, 77 Mountzion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
78, 79, 80 Pelee	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
81*:					
Pelee	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
82 Pilchuck	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy.
83 Pillery	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness, thin layer.
84, 85 Pinchot	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
86 Pinoty	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
87* Pits	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
88, 89 Polepatch	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.

See footnote at end of table.

TABLE 10A.--SANITARY FACILITIES (PREERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
90*----------------- Riverwash	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy, small stones, wetness.
91*:					
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
Cattcreek----------	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: seepage, cinders, slope.
92*:					
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
Rubble land--------	Severe: poor filter, large stones.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: seepage, small stones, slope.
93*:					
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
Xerorthents--------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
94, 95-------------- Shoestring	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
96, 97, 98, 99, 100, 101---------------- Sinnice	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
102*:					
Sinnice------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
103----------------- Skamania	Slight-----------	Severe: seepage.	Severe: seepage.	Slight-----------	Good.

See footnote at end of table.

TABLE 10A.--SANITARY FACILITIES (PREERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
104 Skamania	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
105, 106 Skamania	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
107 Skelida	Moderate	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
108 Skelida	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
109 Skoly	Moderate: slope, large stones.	Severe: slope, large stones.	Severe: large stones.	Moderate: slope.	Poor: small stones.
110, 111 Skoly	Severe: slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: small stones, slope.
112*, 113*: Skoly	Severe: slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
114 St. Helens	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
115 St. Martin	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
116, 117, 118 St. Martin	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too clayey.	Severe: wetness, slope.	Poor: too clayey, hard to pack, slope.
119 Stabbart	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
120 Stabler	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
121, 122 Stabler	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
123, 124 Steever	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.

See footnote at end of table.

TABLE 10A.--SANITARY FACILITIES (PREERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
125*, 126*:					
Steever	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
127 Stevenson	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
128, 129 Stevenson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
130, 131, 132 Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
133*, 134*:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
135, 136 Timberhead	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
137, 138, 139, 140, 141, 142 Tradedollar	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
143 Typic Dystrandepts	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.
144 Underwood	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
145, 146 Underwood	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
147, 148 Undusk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
149, 150, 151, 152, 153 Vanson	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.

See footnote at end of table.

TABLE 10A.--SANITARY FACILITIES (PREERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
154*, 155*, 156*: Vanson	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
157 Washougal	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
158 Washougal	Slight	Severe: seepage.	Severe: seepage.	Slight	Poor: small stones.
159, 160 Washougal	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: small stones, slope.
161*: Xerorthents	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
162, 163, 164 Yalelake	Severe: slope.	Severe: slope.	Severe: slope, too sandy.	Severe: slope.	Poor: too sandy, slope.
165, 166 Zygore	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
167*: Zygore	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
168, 169, 170 Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
171*, 172*: Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 10A.--SANITARY FACILITIFS (PREERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
173---------------- Zynbar	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10B.--SANITARY FACILITIES (POSTERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
200, 201, 202------- Bandid	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope.
203, 204------------ Cattcreek	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
205----------------- Cinnamon	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
206, 207, 208, 209, 210, 211, 212------ Colter	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
213*: Colter-------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
214----------------- Cryandepts	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
215----------------- Elkprairie	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: hard to pack, slope.
216, 217, 218------- Hatchet	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
219*: Hatchet------------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 10B.--SANITARY FACILITIES (POSTERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
220*:					
Hatchet	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
221*:					
Hatchet	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
222 Histic Cryaquepts	Severe: wetness, poor filter.	Severe: seepage, excess humus, wetness.	Severe: seepage, wetness, excess humus.	Severe: seepage, wetness.	Poor: wetness, excess humus.
223, 224, 225 Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
226, 227, 228, 229 Minniepeak	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
230 Obscurity	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, large stones.
231 Panhandle	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
232, 233, 234 Pelee	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
235*:					
Pelee	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 10B.--SANITARY FACILITIES (POSTERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
236 Polepatch	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
237*: Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
Cattcreek	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
238, 239 Shoestring	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
240, 241, 242, 243, 244, 245 Sinnice	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
246*, 247*: Sinnice	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
248* Studebaker	Moderate: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
249 Swift	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
250*: Swift	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
251, 252, 253, 254, 255, 256 Tradedollar	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, cinders.

See footnote at end of table.

TABLE 10B.--SANITARY FACILITIES (POSTERUPTION)--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
257, 258, 259, 260, 261---------------- Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: cinders, slope.
262---------------- Vanson	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
263*:					
Vanson-------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: cinders, slope.
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
264*:					
Vanson-------------	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: cinders, slope.
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
265*:					
Vanson-------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: cinders, slope.
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
266---------------- Wakepish	Severe: flooding, slope.	Severe: seepage, flooding, slope.	Severe: flooding, seepage, slope.	Severe: flooding, seepage, slope.	Poor: seepage, too sandy, small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1 Andic Cryumbrepts	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
2 Arents	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
3 Aschoff	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
4 Aschoff	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
5*:				
Aschoff	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
6* Badland	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
7, 8 Bandid	Poor: slope, cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
9 Bandid	Poor: cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: too sandy, cinders, slope.
10, 11 Bandid	Poor: slope, cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: too sandy, cinders, slope.
12 Bannel	Poor: cinders.	Probable	Improbable: cinders.	Poor: cinders, area reclaim, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
13, 14 Bannel	Poor: slope, cinders.	Probable	Improbable: cinders.	Poor: cinders, area reclaim, slope.
15 Benham	Poor: cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
16 Benham	Poor: slope, cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
17 Bonneville	Fair: large stones.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
18, 19, 20 Cattcreek	Poor: slope, cinders.	Improbable: cinders.	Improbable: thin layer, cinders.	Poor: cinders, area reclaim, slope.
21 Chemawa	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
22 Chemawa	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
23 Chemawa	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
24 Chemawa	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
25 Cinnamon	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
26, 27 Cinnamon	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
28 Colter	Poor: cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
29, 30 Colter	Poor: slope, cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
31 Colter	Poor: cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
32, 33 Colter	Poor: slope, cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
34*:				
Colter	Poor: slope, cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
35 Cryandepts	Poor: slope, cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: too sandy, cinders, area reclaim.
36 Dougan	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
37 Dougan	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
38 Forsyth	Poor: slope.	Improbable: large stones.	Improbable: large stones.	Poor: too sandy, small stones, area reclaim.
39, 40 Forsyth	Fair: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: too sandy, small stones, area reclaim.
41 Fortran	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
42 Haplumbrepts	Fair: large stones, wetness.	Improbable: large stones.	Improbable: large stones.	Poor: small stones, area reclaim.
43, 44, 45, 46 Hatchet	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
47*, 48*, 49*:				
Hatchet	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
50 Hesson	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
51 Hesson	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
52 Hesson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
53 Histic Cryaquepts	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, area reclaim, wetness.
54 Hoffstadt	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones.	Poor: area reclaim, small stones, slope.
55 Hoffstadt	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones.	Poor: area reclaim, small stones, slope.
56 Hood	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
57 Kinney	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
58, 59 Kinney	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
60 Lithic Umbric Vitrandepts	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
61 Lonestar	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, small stones, slope.
62, 63 Lonestar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, small stones, slope.
64 McBee	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
65 McDoug	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
6----- McElroy	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
7----- McElroy	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
8----- McElroy	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
9----- McElroy	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
0----- Minniepeak	Poor: cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
1, 72----- Minniepeak	Poor: slope, cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
----- ossyrock	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
----- ossyrock	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
----- ountzion	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
----- ountzion	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
----- ountzion	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
----- elee	Poor: cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: too sandy, cinders, slope.
, 80----- elee	Poor: slope, cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: too sandy, cinders, slope.
*: elee-----	Poor: slope, cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: too sandy, cinders, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
81*:				
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
82 Pilchuck	Fair: wetness.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim.
83 Pillery	Good	Probable	Probable	Poor: area reclaim.
84 Pinchot	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
85 Pinchot	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
86 Pinoty	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
87* Pits	Good	Probable	Improbable: too sandy.	Poor: too sandy, small stones.
88, 89 Polepatch	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: too sandy, small stones, area reclaim.
90* Riverwash	Poor: wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
91*:				
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Cattcreek	Poor: slope, cinders.	Improbable: small stones.	Improbable: thin layer, cinders.	Poor: cinders, area reclaim, slope.
92*:				
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rubble land	Poor: large stones, slope.	Improbable: small stones, large stones.	Improbable: large stones.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
93*:				
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Xerorthents	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
94 Shoestring	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
95 Shoestring	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
96 Sinnice	Poor: cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
97, 98 Sinnice	Poor: slope, cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
99 Sinnice	Poor: cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
100, 101 Sinnice	Poor: slope, cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
102*:				
Sinnice	Poor: slope, cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
103 Skamania	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
104 Skamania	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
105 Skamania	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
106 Skamania	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
107------------------ Skelida	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
108------------------ Skelida	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
109------------------ Skoly	Fair: large stones, shrink-swell.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
110------------------ Skoly	Fair: large stones, slope, shrink-swell.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
111------------------ Skoly	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
112*:				
Skoly----------------	Fair: large stones, slope, shrink-swell.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
Rock outcrop---------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
113*:				
Skoly----------------	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
Rock outcrop---------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
114------------------ St. Helens	Fair: slope.	Probable-------------	Probable-------------	Poor: too sandy, small stones, area reclaim.
115------------------ St. Martin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
116------------------ St. Martin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
117------------------ St. Martin	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
18 St. Martin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
19 Stabbart	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
20 Stabler	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
21 Stabler	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
22 Stabler	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
23 Steever	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
24 Steever	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
25*:				
Steever	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
26*:				
Steever	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
27 Stevenson	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
28 Stevenson	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
29 Stevenson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
130 Swift	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
131, 132 Swift	Poor: slope, cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: cinders, area reclaim, slope.
133*, 134*:				
Swift	Poor: slope, cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: cinders, area reclaim, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
135 Timberhead	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
136 Timberhead	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
137 Tradedollar	Fair: slope, cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
138, 139 Tradedollar	Poor: slope, cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
140 Tradedollar	Poor: cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
141, 142 Tradedollar	Poor: slope, cinders.	Probable	Improbable: too sandy, cinders.	Poor: too sandy, cinders, area reclaim.
143 Typic Dystrandepts	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
144 Underwood	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
145 Underwood	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
146 Underwood	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
147 Undusk	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
148 Undusk	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
149 Vanson	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
150, 151 Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
152 Vanson	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
153 Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
154*, 155*, 156*:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
157 Washougal	Good	Probable	Probable	Poor: small stones, area reclaim.
158 Washougal	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
159 Washougal	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
160 Washougal	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
161*:				
Xerorthents	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
162 Yalelake	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
163, 164 Yalelake	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
165 Zygore	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
166 Zygore	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
167*:				
Zygore	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
168 Zymer	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
169, 170 Zymer	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
171*, 172*:				
Zymer	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 11A.--CONSTRUCTION MATERIALS (PREERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
173------------------- Zynbar	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11B.--CONSTRUCTION MATERIALS (POSTERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
200 Bandid	Poor: cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: too sandy, cinders, slope.
201, 202 Bandid	Poor: slope, cinders.	Improbable: excess fines.	Improbable: excess fines, cinders.	Poor: too sandy, cinders, slope.
203, 204 Cattcreek	Poor: slope.	Improbable: thin layer.	Probable	Poor: small stones, area reclaim, slope.
205 Cinnamon	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
206 Colter	Fair: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
207, 208 Colter	Poor: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
209 Colter	Fair: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
210, 211, 212 Colter	Poor: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
213*:				
Colter	Poor: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
214 Cryandepts	Poor: slope.	Probable	Improbable: too sandy.	Poor: cinders, area reclaim, slope.

See footnote at end of table.

TABLE 11B.--CONSTRUCTION MATERIALS (POSTERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
215------------------ Elkprairie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
216, 217, 218--------- Hatchet	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
219*:				
Hatchet--------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: cinders, slope.
Rock outcrop---------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
220*:				
Hatchet--------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop---------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
221*:				
Hatchet--------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: cinders, slope.
Rock outcrop---------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
222------------------ Histic Cryaquepts	Poor: wetness.	Probable------------	Improbable: too sandy.	Poor: thin layer, wetness.
223------------------ Lonestar	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
224, 225-------------- Lonestar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
226------------------ Minniepeak	Fair: slope.	Probable------------	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
227, 228, 229--------- Minniepeak	Poor: slope.	Probable------------	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.

See footnote at end of table.

TABLE 11B.--CONSTRUCTION MATERIALS (POSTERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
230 Obscurity	Fair: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: too sandy, large stones, area reclaim.
231 Panhandle	Good	Probable	Probable	Poor: small stones, area reclaim.
232 Pelee	Poor: cinders.	Improbable: thin layer.	Improbable: thin layer, cinders.	Poor: too sandy, cinders, slope.
233, 234 Pelee	Poor: slope, cinders.	Improbable: thin layer.	Improbable: thin layer, cinders.	Poor: too sandy, cinders, slope.
235*:				
Pelee	Poor: slope, cinders.	Improbable: thin layer.	Improbable: thin layer, cinders.	Poor: too sandy, cinders, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
236 Polepatch	Fair: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: small stones, area reclaim, slope.
237*:				
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Cattcreek	Poor: slope.	Improbable: thin layer.	Probable	Poor: small stones, area reclaim, slope.
238 Shoestring	Fair: slope.	Probable	Probable	Poor: area reclaim, slope.
239 Shoestring	Poor: slope.	Probable	Probable	Poor: area reclaim, slope.
240 Sinnice	Poor: cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
241, 242 Sinnice	Poor: slope, cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.

See footnote at end of table.

TABLE 11B.--CONSTRUCTION MATERIALS (POSTERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
243 Sinnice	Fair: slope, cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
244, 245 Sinnice	Poor: slope, cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
246*, 247*:				
Sinnice	Poor: slope, cinders.	Probable	Improbable: cinders.	Poor: too sandy, cinders, area reclaim.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
248* Studebaker	Fair: large stones.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
249 Swift	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
250*:				
Swift	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
251 Tradedollar	Fair: slope.	Probable	Improbable: too sandy.	Poor: small stones, area reclaim, slope.
252, 253 Tradedollar	Poor: slope.	Probable	Improbable: too sandy.	Poor: small stones, area reclaim, slope.
254 Tradedollar	Fair: slope.	Probable	Improbable: too sandy.	Poor: small stones, area reclaim, slope.
255, 256 Tradedollar	Poor: slope.	Probable	Improbable: too sandy.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 11B.--CONSTRUCTION MATERIALS (POSTERUPTION)--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
257 Vanson	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
258, 259 Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
260 Vanson	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
261, 262 Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
263*, 264*, 265*:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
266 Wakepish	Fair: large stones, slope.	Probable	Probable	Poor: small stones, area reclaim, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12A.--WATER MANAGEMENT (PREERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
1----------------- Andic Cryumbrepts	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope.
2----------------- Arents	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones, droughty.
3, 4-------------- Aschoff	Severe: slope.	Moderate: thin layer, seepage, piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
5*:						
Aschoff-----------	Severe: slope.	Moderate: thin layer, seepage, piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	Slight----------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
6*----------------- Badland	Severe: slope.	Slight----------	Severe: no water.	Deep to water	Slope----------	Slope.
7, 8, 9, 10, 11--- Bandid	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
12, 13, 14-------- Bannel	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
15, 16------------ Benham	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
17----------------- Bonneville	Severe: seepage.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones, droughty.
18, 19, 20-------- Cattcreek	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope----------	Slope, droughty.
21---------------- Chemawa	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
22, 23, 24-------- Chemawa	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
25, 26, 27-------- Cinnamon	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope, droughty.

See footnote at end of table.

TABLE 12A.--WATER MANAGEMENT (PREERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
28, 29, 30, 31, 32, 33 Colter	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
34*:						
Colter	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
35 Cryandepts	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
36, 37 Dougan	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
38, 39, 40 Forsyth	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
41 Fortran	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
42 Haplumbrepts	Moderate: seepage.	Severe: seepage, large stones, wetness.	Moderate: slow refill, large stones.	Large stones, frost action.	Large stones, wetness.	Large stones, wetness, droughty.
43, 44, 45, 46 Hatchet	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
47*, 48*, 49*:						
Hatchet	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
50, 51, 52 Hesson	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.
53 Histic Cryaquepts	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy.	Wetness.
54, 55 Hoffstadt	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
56 Hood	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.

See footnote at end of table.

TABLE 12A.--WATER MANAGEMENT (PREERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
57, 58, 59-------- Kinney	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
60---------------- Lithic Umbric Vitrandepts	Severe: depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
61, 62, 63-------- Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
64---------------- McBee	Moderate: seepage.	Moderate: thin layer, wetness.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
65---------------- McDoug	Moderate: seepage.	Moderate: piping, wetness.	Moderate: deep to water, slow refill.	Frost action---	Erodes easily, wetness.	Erodes easily.
66, 67, 68-------- McElroy	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
69---------------- McElroy	Severe: slope.	Moderate: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
70, 71, 72-------- Minniepeak	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
73---------------- Mossyrock	Moderate: seepage, slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Favorable------	Favorable.
74---------------- Mossyrock	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
75, 76, 77-------- Mountzion	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
78, 79, 80-------- Pelee	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
81*:						
Pelee------------	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
82---------------- Pilchuck	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Erodes easily, wetness, too sandy.	Erodes easily, droughty.
83---------------- Pillery	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Erodes easily, soil blowing.	Erodes easily.

See footnote at end of table.

TABLE 12A.--WATER MANAGEMENT (PREERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
84, 85----------- Pinchot	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
86--------------- Pinoty	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope-----------	Slope, droughty.
87*--------------- Pits	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
88, 89----------- Polepatch	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
90*--------------- Riverwash	Severe: seepage.	Severe: wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Large stones, wetness, too sandy.	Large stones, wetness, droughty.
91*:						
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock
Cattcreek--------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope-----------	Slope, droughty.
92*:						
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock
Rubble land------	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
93*:						
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock
Xerorthents------	Severe: seepage, depth to rock, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
94, 95----------- Shoestring	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
96, 97, 98, 99, 100, 101--------- Sinnice	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
102*:						
Sinnice----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.

See footnote at end of table.

TABLE 12A.--WATER MANAGEMENT (PREERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
102*: Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
103 Skamania	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, soil blowing.	Erodes easily.
104, 105, 106 Skamania	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily, soil blowing.	Slope, erodes easily.
107, 108 Skelida	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
109, 110, 111 Skoly	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
112*, 113*: Skoly	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
114 St. Helens	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
115, 116, 117, 118 St. Martin	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Wetness, slope, percs slowly.
119 Stabbart	Slight	Severe: wetness.	Severe: slow refill.	Frost action	Wetness	Wetness.
120 Stabler	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
121, 122 Stabler	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
123, 124 Steever	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
125*, 126*: Steever	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 12A.--WATER MANAGEMENT (PREERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
127, 128, 129 Stevenson	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
130, 131, 132 Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
133*, 134*:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
135, 136 Timberhead	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope, droughty.
137, 138, 139, 140, 141, 142 Tradedollar	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
143 Typic Dystrandepts	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
144, 145, 146 Underwood	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
147, 148 Undusk	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope.
149, 150, 151, 152, 153 Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, soil blowing.	Large stones, slope, droughty.
154*, 155*, 156*:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, soil blowing.	Large stones, slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
157 Washougal	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones, droughty.
158 Washougal	Severe: seepage.	Moderate: thin layer, seepage, piping.	Severe: no water.	Deep to water	Large stones	Large stones, droughty.
159, 160 Washougal	Severe: seepage, slope.	Moderate: thin layer, seepage, piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 12A.--WATER MANAGEMENT (PREERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
161*:						
Xerorthents	Severe: seepage, depth to rock, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
162, 163, 164 Yalelake	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope.
165, 166 Zygore	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, large stones.	Slope, droughty.
167*:						
Zygore	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, large stones.	Slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
168, 169, 170 Zymer	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope	Slope.
171*, 172*:						
Zymer	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope	Slope.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
173 Zynbar	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12B.--WATER MANAGEMENT (POSTERUPTION)

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
200, 201, 202----- Bandid	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
203, 204---------- Cattcreek	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
205--------------- Cinnamon	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty.
206, 207, 208, 209, 210, 211---- Colter	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
212--------------- Colter	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
213*:						
Colter-----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to roc
214--------------- Cryandepts	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
215--------------- Elkprairie	Severe: seepage, slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty.
216, 217, 218----- Hatchet	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, large stones, soil blowing.	Large stones, slope, droughty.
219*:						
Hatchet----------	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to roc
220*:						
Hatchet----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, large stones, soil blowing.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 12B.--WATER MANAGEMENT (POSTERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
220*:						
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
221*:						
Hatchet	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
222 Histic Cryaquepts	Severe: seepage.	Severe: excess humus, wetness.	Severe: cutbanks cave.	Frost action	Wetness, soil blowing.	Wetness.
223, 224, 225 Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty.
226, 227 Minniepeak	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
228, 229 Minniepeak	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
230 Obscurity	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
231 Panhandle	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
232, 233, 234 Pelee	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
235*:						
Pelee	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
236 Polepatch	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
237*:						
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 12B.--WATER MANAGEMENT (POSTERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
237*:						
Cattcreek	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
238, 239 Shoestring	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
240, 241, 242, 243, 244, 245 Sinnice	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
246*:						
Sinnice	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock
247*:						
Sinnice	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock
248* Studebaker	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
249 Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty.
250*:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty.
Rock outcrop	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock
251, 252, 253, 254, 255, 256 Tradedollar	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
257, 258, 259, 260, 261 Vanson	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty.
262 Vanson	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope	Slope, droughty.

See footnote at end of table.

TABLE 12B.--WATER MANAGEMENT (POSTERUPTION)--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
263*:						
Vanson-----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope----------	Slope, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
64*:						
Vanson-----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
65*:						
Vanson-----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope----------	Slope, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
66--------------- Wakepish	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas tic ind
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1---------------- Andic Cryumbrepts	0-17	Cobbly loam------	ML	A-4	20-35	90-100	85-90	70-80	60-70	30-40	NP-5
	17-23	Cobbly loam, loam, silt loam.	ML	A-4	0-40	90-100	80-90	70-80	60-70	25-35	NP-1
	23-39	Very cobbly loam, very cobbly clay loam, cobbly loam.	SC	A-6	20-45	70-90	65-90	40-60	35-50	30-40	10-1
	39-60	Cobbly loam, loam, very cobbly clay loam.	CL, SC	A-6	15-45	80-100	75-90	40-80	35-70	30-40	10-1
2---------------- Arents	0-24	Gravelly sandy loam.	GM, SM	A-2	0	60-80	50-75	40-60	25-35	15-25	NP-5
	24-60	Extremely gravelly sandy loam, very gravelly silt loam, gravelly loam.	GM, SM	A-1, A-2, A-4	5-25	50-85	40-75	30-50	20-40	15-25	NP-5
3, 4------------- Aschoff	0-12	Very gravelly loam.	GM	A-1, A-2	0-5	30-50	25-40	20-40	15-30	20-30	NP-5
	12-47	Very gravelly loam, very cobbly loam, extremely cobbly loam.	GM, SM	A-1, A-2, A-4	20-35	40-80	40-60	25-55	20-50	20-30	NP-5
	47-60	Very gravelly loam, very cobbly loam, extremely cobbly loam.	GM	A-1, A-2, A-4	30-45	30-60	20-50	20-50	15-40	20-30	NP-5
5*:											
Aschoff---------	0-12	Very gravelly loam.	GM	A-1, A-2	0-5	30-50	25-40	20-40	15-30	20-30	NP-5
	12-47	Very gravelly loam, very cobbly loam, extremely cobbly loam.	GM, SM	A-1, A-2, A-4	20-35	40-80	40-60	25-55	20-50	20-30	NP-5
	47-60	Very gravelly loam, very cobbly loam, extremely cobbly loam.	GM	A-1, A-2, A-4	30-45	30-60	20-50	20-50	15-40	20-30	NP-5
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
6*--------------- Badland	0-60	Very cobbly sand, extremely gravelly sand.	GP, SP	A-1	15-30	40-80	25-60	15-30	0-5	---	NP

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
7, 8------------- Bandid	0-7	Loamy sand-------	SM	A-2, A-4	0	80-95	75-90	40-70	25-50	25-35	NP-5
	7-15	Loamy sand-------	SM	A-2, A-4	0	80-95	75-90	40-70	25-50	25-35	NP-5
	15-60	Extremely cindery sand.	SP	A-1	0	55-75	10-25	5-20	0-5	---	NP
9, 10, 11-------- Bandid	0-5	Cindery sandy loam.	SM	A-1, A-2	0	80-90	55-75	35-50	20-30	20-30	NP-5
	5-15	Gravelly fine sandy loam, loamy sand.	SM	A-1, A-2	0	70-90	60-80	40-60	15-35	20-30	NP-5
	15-27	Extremely cindery sand.	SP	A-1	0	55-75	10-25	5-20	0-5	---	NP
	27-60	Stratified cindery sandy loam to sand.	SM	A-1, A-2	0	70-95	60-90	40-60	15-35	20-30	NP-5
12, 13, 14------- Bannel	0-4	Cindery sandy loam.	SM	A-1, A-2	0	80-90	55-70	35-50	15-30	15-25	NP-5
	4-10	Extremely cindery sand.	SP	A-1	0	60-80	10-20	5-15	0-5	---	NP
	10-50	Stratified fine sandy loam to cindery loamy sand.	SM	A-2, A-4	0	80-100	55-85	45-75	25-50	15-25	NP-5
	50-60	Extremely cindery sand, extremely cindery loamy sand.	SP, SP-SM	A-1	0	55-75	10-25	5-20	0-10	---	NP
15, 16----------- Benham	0-6	Very cindery sandy loam.	SM, SP-SM	A-1	0	75-90	25-50	15-35	5-25	---	NP
	6-28	Very cindery sand, extremely cindery sand, very gravelly loamy sand.	SP, SP-SM	A-1	0	75-90	15-40	10-25	0-10	---	NP
	28-38	Cindery sandy loam, fine sandy loam, sandy loam.	SM	A-1, A-2	0	85-95	60-90	40-50	20-30	25-45	NP-10
	38-60	Extremely cindery sand, very cindery loamy sand.	SP, SP-SM	A-1	0-10	75-90	10-45	5-25	0-10	---	NP
17--------------- Bonneville	0-6	Stony sandy loam	SM, GM	A-1, A-2	20-30	60-80	60-75	45-50	20-30	---	NP
	6-12	Extremely gravelly coarse sandy loam.	GM	A-1	20-30	30-40	20-30	15-25	10-15	---	NP
	12-60	Extremely cobbly loamy coarse sand, extremely gravelly coarse sand.	GP, GP-GM	A-1	15-40	25-40	15-30	5-15	0-10	---	NP

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- tici inde
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
18, 19, 20------- Cattcreek	0-6	Very cindery loamy sand.	SM, SP-SM	A-1	0	75-90	25-50	15-30	5-15	---	NP
	6-15	Very cindery sand, very cindery loamy sand.	SP-SM, SP	A-1	0	75-90	25-50	15-35	0-10	---	NP
	15-30	Extremely cindery sand, very gravelly sand.	SP	A-1	0	70-90	10-35	5-20	0-5	---	NP
	30-54	Very gravelly sandy loam, extremely gravelly loam.	GM, GP-GM	A-1, A-2	10-35	20-35	10-35	10-20	5-20	25-45	NP-10
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
21, 22, 23, 24--- Chemawa	0-14	Loam-------------	ML	A-4	0	100	95-100	80-95	70-85	30-40	NP-5
	14-60	Loam, silt loam	ML	A-4	0	95-100	90-100	85-95	80-90	30-40	NP-5
25, 26, 27------- Cinnamon	0-3	Sandy loam-------	SM	A-2, A-4	0	100	90-100	55-70	30-40	30-40	NP-5
	3-22	Loamy sand, sandy loam.	SM	A-1, A-2, A-4	0	100	90-100	45-75	15-40	25-35	NP-5
	22-60	Sandy loam, loam	ML, SM	A-2, A-4	0	85-100	75-90	55-85	30-55	30-40	NP-5
28, 29, 30, 31, 32, 33---------- Colter	0-6	Cindery sandy loam.	SM	A-1, A-2	0	90-95	55-75	35-50	15-30	---	NP
	6-33	Very cindery loamy sand, very cindery sand, extremely cindery sand.	SP, SP-SM, SM	A-1	0	75-90	10-50	10-30	0-15	---	NP
	33-54	Cindery sandy loam, sandy loam, cindery loamy sand.	SM	A-1, A-2	0	85-95	60-90	40-50	20-30	25-45	NP-10
	54-60	Extremely cindery sand.	SP	A-1	0	75-95	10-25	5-20	0-5	---	NP
34*:											
Colter----------	0-6	Cindery sandy loam.	SM	A-1, A-2	0	90-95	55-75	35-50	15-30	---	NP
	6-33	Very cindery loamy sand, very cindery sand, extremely cindery sand.	SP, SP-SM, SM	A-1	0	75-90	10-50	10-30	0-15	---	NP
	33-54	Cindery sandy loam, sandy loam, cindery loamy sand.	SM	A-1, A-2	0	85-95	60-90	40-50	20-30	25-45	NP-10
	54-60	Extremely cindery sand.	SP	A-1	0	75-95	10-25	5-20	0-5	---	NP
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
35----------------- Cryandepts	0-13	Sandy loam-------	SM	A-2, A-4	0-5	90-100	80-90	60-70	30-40	20-30	NP-5
	13-60	Stratified extremely cindery sand to sandy loam.	SM	A-1, A-2	0-5	80-100	25-80	20-50	5-35	15-25	NP-5
36, 37----------- Dougan	0-11	Very gravelly loam.	GM-GC	A-2, A-4	10-15	45-55	40-50	35-45	30-40	20-30	5-10
	11-24	Very gravelly silt loam, very cobbly loam, very gravelly loam.	GM	A-2	10-35	40-55	35-50	30-45	25-35	20-30	NP-5
	24-39	Extremely gravelly loam, extremely cobbly loam.	GM	A-2, A-1	25-45	45-55	15-40	15-35	10-30	20-30	NP-5
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
38--------------- Forsyth	0-8	Cindery loamy sand.	SM, SP-SM	A-1	0-10	90-100	55-70	25-35	5-15	---	NP
	8-60	Very gravelly sand, very cobbly sand, extremely stony sand.	GP, GP-GM, SP, SP-SM	A-1	25-55	35-60	10-45	5-35	0-10	---	NP
39--------------- Forsyth	0-8	Cobbly loamy sand	SM	A-1, A-2	5-15	80-90	70-85	45-55	15-25	---	NP
	8-60	Very gravelly sand, very cobbly sand, extremely stony sand.	GP, GP-GM, SP, SP-SM	A-1	35-55	35-60	10-45	5-30	0-10	---	NP
40--------------- Forsyth	0-8	Stony loamy sand	SM	A-1, A-2	5-15	80-90	70-85	45-55	15-25	---	NP
	8-60	Very gravelly sand, very cobbly sand, extremely stony sand.	GP, GP-GM, SP, SP-SM	A-1	35-55	35-60	10-45	5-30	0-10	---	NP
41--------------- Fortran	0-3	Cindery loamy sand.	SM	A-1, A-2	0	65-95	55-75	30-55	10-25	---	NP
	3-11	Cindery sandy loam.	SM	A-1, A-2	0	70-95	60-75	35-55	20-30	---	NP
	11-17	Very gravelly sandy loam.	SM, GM	A-1	0-15	50-70	40-50	25-35	10-20	---	NP
	17-60	Extremely gravelly loamy sand.	GP, GP-GM	A-1	10-40	25-50	10-35	5-25	0-10	---	NP

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
42--------------- Haplumbrepts	0-3	Gravelly loam----	SM	A-4	0	80-90	55-80	50-60	40-50	20-25	NP-5
	3-8	Gravelly clay loam, gravelly loam.	SM-SC, CL	A-4, A-6	0	80-90	55-80	50-70	40-60	25-40	5-15
	8-15	Cobbly clay loam, cobbly loam, gravelly loam.	SM-SC, CL	A-4, A-6	10-25	90-100	65-85	50-80	40-70	25-40	5-15
	15-30	Extremely cobbly clay loam, gravelly loam, clay loam.	SM-SC, CL	A-4, A-6, A-2	5-65	70-100	55-95	35-70	30-60	25-40	5-15
	30-60	Extremely gravelly loam, extremely cobbly loam, extremely gravelly sandy loam.	GM, GP-GM, GM-GC	A-2, A-1	10-60	50-60	15-30	10-20	5-20	20-30	NP-10
43, 44, 45, 46--- Hatchet	0-3	Gravelly sandy loam.	SM	A-1, A-2	0-10	70-90	65-75	35-50	20-30	30-40	NP-5
	3-10	Gravelly sandy loam, gravelly fine sandy loam.	SM	A-1, A-2	0-10	75-90	65-80	40-65	20-35	30-40	NP-5
	10-20	Extremely cobbly loam.	GM, SM	A-1, A-2	55-65	50-70	30-50	25-45	20-35	30-40	NP-5
	20-28	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam.	GM	A-1	55-60	35-50	15-35	15-25	10-20	30-40	NP-5
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
47*, 48*, 49*:											
Hatchet---------	0-3	Gravelly sandy loam.	SM	A-1, A-2	0-10	70-90	65-75	35-50	20-30	30-40	NP-5
	3-10	Gravelly sandy loam, gravelly fine sandy loam.	SM	A-1, A-2	0-10	75-90	65-80	40-65	20-35	30-40	NP-5
	10-20	Extremely cobbly loam.	GM, SM	A-1, A-2	55-65	50-70	30-50	25-45	20-35	30-40	NP-5
	20-28	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam.	GM	A-1	55-60	35-50	15-35	15-25	10-20	30-40	NP-5
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
50, 51, 52------- Hesson	0-19	Clay loam--------	CL	A-6	0	90-100	90-100	85-100	65-80	30-40	10-15
	19-60	Clay loam, clay, silty clay loam.	CL	A-7, A-6	0	90-100	90-100	90-100	65-95	35-45	15-20

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
53--------------- Histic Cryaquepts	0-13	Muck-------------	PT	A-8	---	---	---	---	---	---	---
	13-21	Loamy sand-------	SM	A-2, A-4	0	100	90-100	60-80	20-40	---	NP
	21-31	Gravelly sandy loam, sandy loam, very gravelly sandy loam.	SM, GM	A-4, A-1, A-2	0	60-90	40-85	30-60	15-40	---	NP
	31-35	Sapric material	PT	A-8	---	---	---	---	---	---	---
	35-60	Gravelly coarse sand, very gravelly coarse sand.	SP-SM	A-1	0	80-90	45-70	20-30	5-10	---	NP
54, 55----------- Hoffstadt	0-4	Very gravelly sandy loam.	GM, SM	A-1, A-2	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	4-36	Very gravelly sandy loam, very cobbly sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	36-55	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	30-85	35-65	15-60	10-40	5-20	25-45	NP-10
	55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
56--------------- Hood	0-8	Loam-------------	ML	A-4	0	100	100	90-95	70-75	25-30	NP-5
	8-60	Silt loam, loam	ML, CL-ML	A-4	0	100	100	80-90	75-80	20-30	NP-10
57, 58, 59------- Kinney	0-12	Loam-------------	MH	A-7	0-10	90-100	80-90	70-85	50-65	60-70	10-20
	12-28	Gravelly clay loam, silt loam, loam.	MH, SM	A-7	0-5	80-95	60-80	50-70	40-60	50-65	10-20
	28-60	Loam, gravelly loam.	ML, SM	A-4	0-5	85-95	65-85	55-75	40-60	25-35	NP-5
60--------------- Lithic Umbric Vitrandepts	0-2	Sandy loam-------	SM	A-4	0	90-100	80-90	60-70	40-50	30-35	NP-5
	2-6	Very cindery loamy sand, cindery loamy sand.	SM	A-1, A-2	0	75-95	30-75	20-55	10-20	---	NP
	6	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
61, 62, 63------- Lonestar	0-7	Cindery sandy loam.	SM	A-1, A-2	0	80-90	50-75	40-65	20-35	25-35	NP-5
	7-14	Sandy loam, cindery sandy loam.	SM	A-1, A-2	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	14-28	Cindery loamy sand, loamy sand, cindery sand.	SM, SP-SM	A-1	0-5	70-90	30-85	20-40	5-20	---	NP
	28-51	Gravelly loam, gravelly sandy loam.	ML, SM	A-1, A-2, A-4	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
	51-60	Silt loam, loam	ML	A-4	0	90-100	85-100	75-100	50-90	30-40	NP-5

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
64--------------- McBee	0-13	Silt loam--------	CL-ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	13-43	Silt loam, clay loam, silty clay loam.	CL	A-6	0	100	100	95-100	75-90	30-40	15-25
	43-60	Silt loam, clay loam, loam.	CL-ML	A-4	0	100	100	90-100	70-90	25-35	5-10
65--------------- McDoug	0-12	Silt loam--------	CL-ML	A-4	0	100	100	95-100	75-90	20-30	5-10
	12-38	Clay loam, loam, sandy clay loam.	CL	A-6	0	100	90-100	85-95	55-75	25-40	10-20
	38-60	Clay loam, sandy clay loam, gravelly sandy loam.	CL, SM-SC, SC	A-6, A-4	0-5	80-100	60-100	50-85	40-60	20-35	5-15
66, 67, 68------- McElroy	0-10	Gravelly loam----	ML, SM, GM	A-4	0-5	60-80	55-70	50-70	35-55	25-30	NP-5
	10-60	Very gravelly loam, very cobbly loam, extremely gravelly loam.	GM	A-2, A-1	20-40	30-60	20-50	15-40	10-35	25-35	NP-5
69--------------- McElroy	0-10	Very stony loam	SM	A-4	10-25	70-80	60-75	50-70	35-50	20-25	NP-5
	10-60	Very gravelly loam, very cobbly loam, extremely gravelly loam.	GM	A-2, A-1	20-35	45-65	30-50	25-45	20-35	25-30	NP-5
70, 71, 72------- Minniepeak	0-3	Cindery sandy loam.	SM	A-1, A-2	0	80-90	65-75	40-50	20-30	30-40	NP-5
	3-8	Loamy sand, sandy loam.	SM	A-1, A-2	0	100	85-100	45-75	15-30	30-40	NP-5
	8-60	Very cindery sandy loam, extremely cindery sand, extremely cindery coarse sand.	SP	A-1	0-5	75-85	10-45	5-30	0-5	---	NP
73, 74----------- Mossyrock	0-27	Silt loam--------	OH, MH, ML, OL	A-5, A-7	0	100	100	90-100	70-85	45-65	5-20
	27-60	Silt loam--------	ML, MH	A-5, A-7	0	100	100	90-100	70-85	40-60	5-20
75, 76, 77------- Mountzion	0-17	Clay loam--------	ML	A-7	0	100	75-90	70-80	60-75	40-50	10-15
	17-60	Silty clay loam, clay loam, gravelly clay loam.	ML	A-7	0	95-100	70-90	65-90	55-85	40-50	10-15

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
78, 79, 80------- Pelee	0-7	Sandy loam-------	SM	A-2, A-4	0	100	95-100	60-70	30-40	25-35	NP-5
	7-32	Extremely cindery sand, very cindery sand, very cindery coarse sand.	SP	A-1	0	50-70	15-30	10-15	0-5	---	NP
	32-60	Sandy loam, loamy sand.	SM	A-1, A-2, A-4	0	95-100	90-100	45-75	15-40	30-40	NP-5
81*:											
Pelee-----------	0-7	Sandy loam-------	SM	A-2, A-4	0	100	95-100	60-70	30-40	25-35	NP-5
	7-32	Extremely cindery sand, very cindery sand, very cindery coarse sand.	SP	A-1	0	50-70	15-30	10-15	0-5	---	NP
	32-60	Sandy loam, loamy sand.	SM	A-1, A-2, A-4	0	95-100	90-100	45-75	15-40	30-40	NP-5
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
82--------------- Pilchuck	0-9	Very fine sandy loam.	ML	A-4	0	100	100	85-95	50-65	---	NP
	9-46	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-2	0	80-100	75-100	50-80	5-15	---	NP
	46-60	Fine sandy loam, loamy fine sand.	SM	A-4	0	100	100	70-85	40-50	---	NP
83--------------- Pillery	0-9	Fine sandy loam	SM	A-4	0	100	100	70-85	40-50	15-20	NP-5
	9-20	Stratified silt loam to fine sandy loam.	ML	A-4	0	90-100	80-100	70-80	50-70	20-25	NP-5
	20-45	Stratified fine sandy loam to loamy fine sand.	SM	A-2, A-4	0-5	90-100	85-100	60-80	20-40	15-20	NP-5
	45-60	Very gravelly loamy sand, gravelly sand, very gravelly sand.	SP	A-1	5-25	60-80	35-55	10-40	0-5	---	NP
84, 85----------- Pinchot	0-6	Cindery sandy loam.	SM	A-2, A-1	0	90-100	50-75	40-50	15-30	30-40	NP-5
	6-34	Sandy loam, cindery sandy loam, fine sandy loam.	SM	A-2	0	70-85	50-75	40-60	25-35	30-40	NP-5
	34-60	Extremely gravelly sand, very cobbly sand, very gravelly loamy sand.	GP, SP, GP-GM, SP-SM	A-1	15-50	45-60	25-45	15-25	0-10	---	NP

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
86 Pinoty	0-6	Sandy loam	SM	A-2, A-4	0	100	85-100	60-70	30-40	15-25	NP-5
	6-21	Cindery loamy sand, cindery sandy loam, sandy loam.	SM	A-1, A-2, A-4	0	95-100	70-100	40-75	15-40	15-25	NP-5
	21-30	Gravelly sandy loam, gravelly loamy sand, sandy loam.	SM	A-1, A-2, A-4	0	95-100	70-100	40-75	15-40	30-40	NP-5
	30-45	Gravelly loam, gravelly sandy loam, sandy loam.	SM, ML	A-1, A-2, A-4	0	95-100	70-100	45-85	15-60	20-30	NP-5
	45-60	Extremely gravelly loamy sand, extremely gravelly sand, very gravelly sand.	SP, GP, SP-SM, GP-GM	A-1	10-25	30-60	20-45	10-30	0-10	---	NP
87* Pits	0-10	Coarse sand	SP, SW	A-1, A-3	0	100	80-100	30-60	0-5	---	NP
	10-60	Coarse sand, sand, gravelly coarse sand.	SP, SW	A-1, A-3	0	80-100	50-100	20-60	0-5	---	NP
88, 89 Polepatch	0-12	Extremely bouldery loamy sand.	SM, GM	A-1	25-50	55-80	40-65	20-50	10-20	---	NP
	12-60	Extremely cobbly sand, extremely stony coarse sand, extremely cobbly loamy sand.	GP, GP-GM	A-1	40-65	20-50	10-45	5-30	0-10	---	NP
90* Riverwash	0-6	Gravelly coarse sand.	GP, GP-GM, GW, GW-GM	A-1	0-5	50-80	50-75	15-45	0-10	---	NP
	6-60	Stratified gravelly sand to extremely gravelly coarse sand.	GP, SP, GW, SW	A-1	0-25	25-55	25-50	10-30	0-5	---	NP
91*:											
Rock outcrop	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
91*:											
Cattcreek-------	0-6	Very cindery loamy sand.	SM, SP-SM	A-1	0	75-90	25-50	15-30	5-15	---	NP
	6-15	Very cindery sand, very cindery loamy sand.	SP-SM, SP	A-1	0	75-90	25-50	15-35	0-10	---	NP
	15-30	Extremely cindery sand.	SP	A-1	0	70-90	10-35	5-20	0-5	---	NP
	30-54	Very gravelly sandy loam, extremely gravelly loam.	GM, GP-GM	A-1, A-2	10-35	20-35	10-35	10-20	5-20	25-45	NP-10
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
92*:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rubble land-----	0-60	Fragmental material.	GP	A-1	75-90	0-10	0-5	0-5	0	---	NP
93*:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Xerorthents-----	0-6	Gravelly loam----	SM	A-4	0	70-80	60-75	55-65	40-50	20-25	NP-5
	6-31	Very gravelly loam, extremely gravelly clay loam, silt loam.	ML, SM, GM	A-4, A-2, A-1, A-6	0-25	40-95	25-85	20-70	15-60	25-40	NP-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
94, 95----------- Shoestring	0-5	Fine sandy loam	ML, SM	A-4	0	90-100	85-100	60-85	35-55	---	NP
	5-8	Very gravelly sand.	SP	A-1	0	70-80	25-50	5-15	0-5	---	NP
	8-24	Sandy loam, loamy sand.	SM	A-1, A-2, A-4	0	100	90-100	45-75	15-40	30-40	NP-5
	24-60	Very gravelly sand, very cobbly sand.	SP, GP, SP-SM, GP-GM	A-1	20-35	45-75	35-55	20-40	0-10	---	NP
96, 97, 98, 99, 100, 101-------- Sinnice	0-7	Extremely cindery loamy sand.	GP-GM	A-1	0	25-40	15-25	10-20	5-10	---	NP
	7-15	Loamy sand, sandy loam, fine sandy loam.	ML, SM	A-1, A-2, A-4	0	85-100	75-100	40-85	20-55	30-40	NP-5
	15-60	Extremely cindery sand.	GP	A-1	0	20-40	10-25	5-20	0-5	---	NP

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
102*:											
Sinnice	0-7	Extremely cindery loamy sand.	GP-GM	A-1	0	25-40	15-25	10-20	5-10	---	NP
	7-15	Loamy sand, sandy loam, fine sandy loam.	ML, SM	A-1, A-2, A-4	0	85-100	75-100	40-85	20-55	30-40	NP-5
	15-60	Extremely cindery sand.	GP	A-1	0	20-40	10-25	5-20	0-5	---	NP
Rock outcrop	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
103, 104, 105, 106 Skamania	0-10	Very fine sandy loam.	ML	A-4	0	100	90-100	85-95	50-65	---	NP
	10-43	Fine sandy loam, very fine sandy loam, loam.	ML	A-4	0	100	100	60-85	50-65	15-25	NP-5
	43-60	Loamy fine sand, fine sandy loam.	SM	A-4, A-2	0-5	95-100	90-100	60-80	25-50	---	NP
107, 108 Skelida	0-15	Silt loam	ML	A-4	0	100	100	90-100	70-90	20-25	NP-5
	15-60	Silt loam	ML, CL-ML	A-4	0	100	100	90-100	75-90	25-35	5-10
109, 110, 111 Skoly	0-5	Stony loam	SM-SC, CL-ML, SM, ML	A-4	15-25	70-85	65-85	55-75	40-60	25-35	5-10
	5-40	Very cobbly loam, very cobbly clay loam, very gravelly clay loam.	GC, GM-GC	A-4, A-6	20-50	55-65	45-60	45-55	35-50	25-35	5-15
	40-60	Very cobbly loam, very cobbly clay loam, extremely cobbly loam.	GM-GC, GC	A-4, A-6, A-2	55-65	50-75	45-70	40-70	30-50	25-35	5-15
112*, 113*:											
Skoly	0-5	Stony loam	SM-SC, CL-ML, SM, ML	A-4	15-25	70-85	65-85	55-75	40-60	25-35	5-10
	5-40	Very cobbly loam, very cobbly clay loam, very gravelly clay loam.	GC, GM-GC	A-4, A-6	20-50	55-65	45-60	45-55	35-50	25-35	5-15
	40-60	Very cobbly loam, very cobbly clay loam, extremely cobbly loam.	GM-GC, GC	A-4, A-6, A-2	55-65	50-75	45-70	40-70	30-50	25-35	5-15
Rock outcrop	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
114-------------- St. Helens	0-6	Sandy loam-------	SM	A-2, A-4	0	95-100	75-95	50-70	25-40	30-40	NP-5
	6-9	Extremely cindery loamy sand.	SP	A-1	0	60-80	10-25	5-20	0-5	---	NP
	9-18	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	85-100	75-90	45-75	25-50	30-40	NP-5
	18-28	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0	85-100	75-90	40-65	5-20	---	NP
	28-60	Very gravelly coarse sand.	SP, GP	A-1	10-25	40-65	30-55	10-20	0-5	---	NP
115, 116, 117, 118------------- St. Martin	0-4	Gravelly silty clay loam.	CL	A-6, A-7	0	90-100	60-70	50-60	50-60	35-45	15-25
	4-11	Silty clay loam, clay, clay loam.	CL	A-6, A-7	0-10	90-100	80-100	60-90	50-85	35-50	15-30
	11-60	Clay------------	CL, CH	A-7	0-10	85-100	85-100	80-90	70-80	40-55	20-35
119-------------- Stabbart	0-13	Clay loam--------	CL	A-6, A-7	0	100	95-100	85-100	60-80	35-45	15-20
	13-37	Clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-85	35-45	15-25
	37-60	Clay loam--------	CL	A-6, A-7	0	100	95-100	70-90	60-75	35-45	15-25
120, 121, 122---- Stabler	0-9	Loam-------------	ML	A-4	0	100	95-100	80-95	60-80	30-35	NP-5
	9-37	Loam, silt loam	ML	A-4	0	100	95-100	80-100	60-90	30-35	NP-5
	37-60	Sandy loam, loam	ML, SM	A-4, A-2	0	100	95-100	60-85	30-60	20-30	NP-5
123, 124--------- Steever	0-5	Stony clay loam	CL, SC, GC	A-6	15-25	70-80	65-70	60-70	45-55	30-40	10-15
	5-12	Gravelly clay loam.	GC	A-6	0-10	65-70	55-65	50-60	40-50	30-40	10-15
	12-60	Very gravelly clay loam, very gravelly loam, very gravelly silt loam.	GM-GC, GC	A-2, A-4, A-6	0-15	35-55	30-50	25-50	20-45	25-40	5-15
125*, 126*:											
Steever---------	0-5	Stony clay loam	CL, SC, GC	A-6	15-25	70-80	65-70	60-70	45-55	30-40	10-15
	5-12	Gravelly clay loam.	GC	A-6	0-10	65-70	55-65	50-60	40-50	30-40	10-15
	12-60	Very gravelly clay loam, very gravelly loam, very gravelly silt loam.	GM-GC, GC	A-2, A-4, A-6	0-15	35-55	30-50	25-50	20-45	25-40	5-15
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
27, 128, 129---- Stevenson	0-11	Loam-------------	CL	A-6	0	100	95-100	90-100	70-80	25-30	10-15
	11-37	Clay loam, loam, silt loam.	CL, CL-ML	A-4, A-6	0-10	85-100	80-100	60-90	50-80	25-40	5-20
	37-60	Clay loam, loam, gravelly clay loam.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-10	65-100	55-100	50-90	40-70	25-40	5-20

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Pl ti in
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
130, 131, 132---- Swift	0-12	Cindery sandy loam.	SM	A-1, A-2	0	75-95	50-70	30-50	15-30	15-25	NP
	12-27	Very cindery loam, very cindery sandy loam.	SM	A-1, A-2	0	70-90	35-50	25-45	10-35	15-25	NP
	27-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam.	SM, GM	A-1, A-2, A-4	30-50	35-70	25-60	20-50	15-45	30-40	NP
133*, 134*:											
Swift-----------	0-12	Cindery sandy loam.	SM	A-1, A-2	0	75-95	50-70	30-50	15-30	15-25	NP-
	12-27	Very cindery loam, very cindery sandy loam.	SM	A-1, A-2	0	70-90	35-50	25-45	10-35	15-25	NP-
	27-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam.	SM, GM	A-1, A-2, A-4	30-50	35-70	25-60	20-50	15-45	30-40	NP-
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	--
135, 136--------- Timberhead	0-10	Gravelly loam----	ML, SM, GM	A-4	0-10	65-80	55-70	45-65	35-55	25-30	NP-
	10-40	Gravelly loam----	ML, SM	A-4	0-5	75-85	65-75	55-70	40-55	25-30	NP-
	40-60	Loam-------------	ML	A-4	0-5	90-100	85-100	70-95	50-85	25-30	NP-
137, 138, 139, 140, 141, 142--- Tradedollar	0-5	Sandy loam-------	SM	A-2, A-4	0	95-100	85-100	55-70	30-40	---	NP
	5-26	Cindery sandy loam, very cindery sandy loam.	SM	A-1, A-2	0	80-95	30-75	20-50	10-30	---	NP
	26-42	Extremely cindery sand, extremely cindery loamy sand.	SP	A-1	0	80-95	5-25	0-15	0-5	---	NP
	42-60	Cindery sandy loam, very gravelly loam, very gravelly sandy loam.	SM	A-1, A-2, A-4, A-5	0	70-85	30-75	20-70	10-50	25-45	NP-
143-------------- Typic Dystrandepts	0-10	Loam-------------	ML	A-4	0	90-100	80-90	60-70	50-60	25-35	NP-
	10-41	Very stony loam, silt loam, cobbly loam.	SM	A-4	10-45	90-100	75-90	55-70	40-50	25-35	NP-
	41-60	Cobbly loam, very stony loam, very cobbly loam.	SM	A-4	20-40	90-100	70-80	60-70	40-50	25-35	NP-

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
144, 145, 146 Underwood	0-5	Loam	ML	A-4	0	95-100	90-100	75-95	50-75	20-30	NP-5
	5-35	Loam, clay loam	CL	A-6	0	85-100	75-100	60-95	50-75	30-40	10-15
	35-60	Loam, clay loam, gravelly loam.	CL-ML, SM-SC, CL, SC	A-6, A-4	0-5	75-100	60-100	50-95	40-75	25-35	5-15
147, 148 Undusk	0-15	Gravelly loam	ML, GM, SM	A-4	0	60-80	55-75	50-70	35-55	20-30	NP-5
	15-60	Very cobbly loam, very gravelly loam, extremely gravelly loam.	SM-SC, GM-GC	A-2	0-45	40-80	25-50	20-50	15-35	25-30	5-10
149, 150, 151, 152, 153 Vanson	0-16	Sandy loam	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	---	NP
	16-24	Very gravelly loamy sand, gravelly sandy loam, loamy sand.	SM	A-1, A-2	0	75-90	40-90	30-50	10-30	---	NP
	24-45	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam.	GM	A-1, A-2	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
154*, 155*, 156*: Vanson	0-16	Sandy loam	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	---	NP
	16-24	Very gravelly loamy sand, gravelly sandy loam, loamy sand.	SM	A-1, A-2	0	75-90	40-90	30-50	10-30	---	NP
	24-45	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam.	GM	A-1, A-2	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
157-------------- Washougal	0-5	Loam------------	ML	A-4	0	95-100	90-100	75-95	55-75	25-30	NP-5
	5-22	Gravelly loam----	SM, ML	A-4	0-10	70-85	60-75	50-70	35-55	20-25	NP-5
	22-30	Very gravelly loam.	GM, SM	A-2, A-4	0-25	50-70	35-50	30-45	25-40	20-25	NP-5
	30-36	Very gravelly coarse sandy loam, very gravelly loamy sand, very cobbly loamy sand.	GM, SM	A-1	10-40	40-70	30-65	15-45	10-25	15-20	NP-5
	36-60	Extremely cobbly coarse sand, very gravelly coarse sand, extremely gravelly coarse sand.	SP, GP, SP-SM, GP-GM	A-1	35-50	30-70	15-65	5-30	0-10	---	NP
158, 159, 160---- Washougal	0-11	Gravelly loam----	ML, SM	A-4	0-10	70-85	60-75	50-70	35-55	25-30	NP-5
	11-44	Very gravelly loam.	GM	A-2, A-4	0-25	50-70	35-50	30-45	25-40	20-25	NP-5
	44-60	Very gravelly coarse sandy loam, extremely gravelly sandy loam, very cobbly coarse sand.	GM, SM	A-1	25-40	40-70	30-65	15-45	10-25	15-20	NP-5
161*:											
Xerorthents-----	0-6	Gravelly loam----	SM	A-4	0	70-80	60-75	55-65	40-50	20-25	NP-5
	6-31	Very gravelly loam, extremely gravelly clay loam, silt loam.	ML, SM, GM	A-4, A-2, A-1, A-6	0-25	40-95	25-85	20-70	15-60	25-40	NP-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
162, 163, 164---- Yalelake	0-11	Sandy loam-------	SM	A-2, A-4	0	95-100	85-100	55-70	30-40	---	NP
	11-20	Gravelly loamy sand, gravelly sandy loam.	SM	A-1, A-2	0-10	70-90	55-75	30-60	15-30	---	NP
	20-39	Sandy loam, loam, gravelly sandy loam.	SM, ML	A-4	0	75-90	60-85	50-80	35-65	30-40	NP-5
	39-60	Stratified sand to gravelly loam.	SM	A-4	0	75-90	60-85	45-75	35-50	30-40	NP-5

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
165, 166--------- Zygore	0-14	Gravelly loam----	ML, SM	A-4	0-10	75-90	60-75	50-70	40-55	30-35	NP-5
	14-37	Very gravelly loam, very gravelly silt loam.	SM, GM	A-2, A-4	10-15	65-90	40-50	35-50	30-45	30-35	NP-5
	37-60	Very gravelly loam, extremely gravelly silt loam, very cobbly loam.	GM, SM	A-1, A-2, A-4	15-35	40-70	20-50	15-50	10-40	30-35	NP-5
167*:											
Zygore----------	0-14	Gravelly loam----	ML, SM	A-4	0-10	75-90	60-75	50-70	40-55	30-35	NP-5
	14-37	Very gravelly loam, very gravelly silt loam.	SM, GM	A-2, A-4	10-15	65-90	40-50	35-50	30-45	30-35	NP-5
	37-60	Very gravelly loam, extremely gravelly silt loam, very cobbly loam.	GM, SM	A-1, A-2, A-4	15-35	40-70	20-50	15-50	10-40	30-35	NP-5
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
168, 169, 170---- Zymer	0-4	Sandy loam-------	SM	A-2	0	85-100	80-90	50-60	20-35	15-25	NP-5
	4-10	Loamy sand, sandy loam.	SM	A-1, A-2	0	85-100	80-90	40-60	10-25	---	NP
	10-22	Cindery loamy sand, loamy sand.	SM	A-1, A-2	0	85-100	50-90	25-60	10-25	---	NP
	22-28	Very gravelly loam.	SM, GM	A-1, A-2	0	45-70	35-50	25-45	20-35	25-35	NP-5
	28-60	Very gravelly loam, extremely gravelly loam, extremely gravelly clay loam.	GM	A-1, A-2	0-30	25-60	15-45	15-40	15-35	25-40	NP-10
171*, 172*:											
Zymer-----------	0-4	Sandy loam-------	SM	A-2	0	85-100	80-90	50-60	20-35	15-25	NP-5
	4-10	Loamy sand, sandy loam.	SM	A-1, A-2	0	85-100	80-90	40-60	10-25	---	NP
	10-22	Cindery loamy sand, loamy sand.	SM	A-1, A-2	0	85-100	50-90	25-60	10-25	---	NP
	22-28	Very gravelly loam.	SM, GM	A-1, A-2	0	45-70	35-50	25-45	20-35	25-35	NP-5
	28-60	Very gravelly loam, extremely gravelly loam, extremely gravelly clay loam.	GM	A-1, A-2	0-30	25-60	15-45	15-40	15-35	25-40	NP-10
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13A.--ENGINEERING INDEX PROPERTIES (PREERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
173-------------- Zynbar	0-6	Gravelly silt loam.	ML, SM, MH	A-4, A-5, A-7	0-5	75-90	60-75	55-70	45-60	35-60	NP-20
	6-47	Silt loam, gravelly silt loam.	ML, SM, MH	A-4, A-5, A-7, A-6	0-5	75-95	60-90	55-85	45-80	35-60	5-25
	47-60	Very gravelly silt loam, very gravelly loam, extremely stony silt loam.	GM	A-2, A-4, A-5, A-7	15-55	50-65	30-60	30-55	25-45	35-60	NP-20

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
00, 201--------- Bandid	0-4	Extremely cindery loamy sand.	SP-SM	A-1	0	70-80	15-25	10-20	5-10	---	NP
	4-14	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-17	Cindery sandy loam.	SM	A-4, A-2	0	90-100	60-85	50-60	20-40	20-30	NP-5
	17-33	Cindery fine sandy loam, loamy sand.	SM	A-1, A-2	0	70-90	60-85	40-60	15-35	20-30	NP-5
	33-44	Extremely cindery sand.	SP	A-1	0	55-75	10-25	5-20	0-5	---	NP
	44-60	Stratified sandy loam to cindery sand.	SM	A-1, A-2	0	70-95	60-90	40-60	15-35	20-30	NP-5
02-------------- andid	0-4	Extremely cindery loamy sand.	SP-SM	A-1	0	70-80	15-25	10-20	5-10	---	NP
	4-14	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-23	Cindery sandy loam.	SM	A-4, A-2	0	90-100	60-85	50-60	20-40	20-30	NP-5
	23-33	Cindery fine sandy loam, loamy sand.	SM	A-1, A-2	0	70-90	60-85	40-60	15-35	20-30	NP-5
	33-44	Extremely cindery sand.	SP	A-1	0	55-75	10-25	5-20	0-5	---	NP
	44-60	Stratified sandy loam to cindery sand.	SM	A-1, A-2	0	70-95	60-90	40-60	15-35	20-30	NP-5
3, 204--------- attcreek	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-95	60-80	20-30	---	NP
	15-21	Very cindery loamy sand.	SM, SP-SM	A-1	0	75-90	25-50	15-30	5-15	---	NP
	21-30	Very cindery sand, very gravelly loamy sand.	SP-SM, SP	A-1	0	70-90	10-25	5-20	0-5	---	NP
	30-45	Extremely cindery sand.	SP	A-1	0	70-90	10-25	5-20	0-5	---	NP
	45-60	Very gravelly sandy loam, extremely gravelly loam.	GM, GP-GM	A-1, A-2	25-35	20-35	10-35	10-20	5-20	35-45	NP-10
5-------------- innamon	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-18	Sandy loam-------	SM	A-2, A-4	0	100	90-100	55-70	30-40	30-40	NP-5
	18-37	Loamy sand, sandy loam.	SM	A-1, A-2, A-4	0	100	90-100	45-75	15-40	25-35	NP-5
	37-60	Sandy loam, loam	ML, SM	A-2, A-4	0	85-100	75-90	55-85	30-55	30-40	NP-5

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
206, 207, 208, 209, 210, 211---Colter	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-21	Cindery sandy loam.	SM	A-1, A-2	0	90-95	55-75	35-50	15-30	---	NP
	21-48	Very cindery loamy sand, very cindery sand, extremely cindery sand.	SP	A-1	0	75-90	10-50	10-30	0-5	---	NP
	48-60	Cindery sandy loam, sandy loam, cindery loamy sand.	SM	A-1, A-2	0	85-95	60-90	40-50	20-30	35-45	NP-10
212--------------Colter	0-4	Extremely cindery loamy sand.	SP	A-1	0	70-80	15-25	10-15	0-5	---	NP
	4-14	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-20	Cindery sandy loam.	SM	A-4, A-2	0	90-100	55-75	50-60	20-40	---	NP
	20-47	Very gravelly loamy sand, very gravelly sand, extremely cindery sand.	SP	A-1	0	75-90	10-50	10-30	0-5	---	NP
	47-60	Gravelly sandy loam, sandy loam, gravelly loamy sand.	SM	A-1, A-2	0	85-95	60-90	40-50	20-30	25-45	NP-10
213*:											
Colter-----------	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-21	Cindery sandy loam.	SM	A-1, A-2	0	90-95	55-75	35-50	15-30	---	NP
	21-48	Very gravelly loamy sand, very gravelly sand, extremely cindery sand.	SP	A-1	0	75-90	10-50	10-30	0-5	---	NP
	48-60	Gravelly sandy loam, sandy loam, gravelly loamy sand.	SM	A-1, A-2	0	85-95	60-90	40-50	20-30	35-45	NP-10
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
214--------------- Cryandepts	0-4	Extremely cindery loamy sand.	SP	A-1	0-10	70-80	15-25	5-15	0-5	---	NP
	4-14	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-30	Sandy loam--------	SM	A-2, A-4	0	90-100	75-90	50-60	30-40	---	NP
	30-60	Stratified extremely cindery sand to sandy loam.	SM, SP-SM	A-1, A-2	0-5	80-100	25-80	20-50	5-35	15-25	NP-5
215--------------- Elkprairie	0-6	Loamy sand-------	SM	A-2	0	90-100	80-90	50-75	20-30	---	NP
	6-17	Sand, cindery sand.	SP-SM, SM	A-2, A-3	0-5	80-90	60-85	50-70	5-15	---	NP
	17-23	Gravelly loamy sand, very cindery sand, loamy sand.	SM, SP-SM	A-1	0-5	70-90	45-85	20-40	5-20	---	NP
	23-36	Cindery loam, gravelly sandy loam, fine sandy loam.	ML, SM	A-1, A-2, A-4	0-5	70-90	60-80	35-70	20-55	30-40	NP-5
	36-60	Loam-------------	ML, MH	A-5, A-7	0-5	85-100	80-100	75-100	65-90	40-60	5-20
216, 217, 218---- Hatchet	0-10	Loamy sand-------	SM	A-2	0-5	90-100	90-100	50-75	20-30	---	NP
	10-13	Gravelly sandy loam.	SM	A-1, A-2	0-10	70-90	65-75	35-50	20-30	30-40	NP-5
	13-20	Gravelly sandy loam, gravelly fine sandy loam.	SM	A-1, A-2	0-10	70-90	55-75	40-65	20-35	30-40	NP-5
	20-30	Extremely cobbly loam, very cobbly loam.	GM, SM	A-1, A-2	25-60	50-70	30-50	25-45	20-35	30-40	NP-5
	30-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam.	GM, GP-GM	A-1	55-60	35-50	15-35	10-25	5-20	30-40	NP-5
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticit index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
219*:											
Hatchet---------	0-4	Extremely cindery loamy sand.	SP	A-1	0	70-80	15-25	10-15	0-5	---	NP
	4-10	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	10-20	Gravelly sandy loam, gravelly fine sandy loam.	SM	A-4, A-2	0	90-100	60-85	50-65	20-40	20-30	NP-5
	20-30	Extremely cobbly loam.	GM, SM	A-1, A-2	55-65	50-70	30-50	25-45	20-35	30-40	NP-5
	30-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam.	GM	A-1	55-60	35-50	15-35	15-25	10-20	30-40	NP-5
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
220*:											
Hatchet---------	0-10	Loamy sand-------	SM	A-2	0-5	90-100	90-100	50-75	20-30	---	NP
	10-13	Gravelly sandy loam.	SM	A-1, A-2	0-10	70-90	65-75	35-50	20-30	30-40	NP-5
	13-20	Gravelly sandy loam, gravelly fine sandy loam.	SM	A-1, A-2	0-10	70-90	55-75	40-65	20-35	30-40	NP-5
	20-30	Extremely cobbly loam, very cobbly loam.	GM, SM	A-1, A-2	25-60	50-70	30-50	25-45	20-35	30-40	NP-5
	30-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam.	GM, GP-GM	A-1	55-60	35-50	15-35	10-25	5-20	30-40	NP-5
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
221*:											
Hatchet---------	0-4	Extremely cindery loamy sand.	SP	A-1	0	70-80	15-25	10-15	0-5	---	NP
	4-14	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-20	Gravelly sandy loam, gravelly fine sandy loam.	SM	A-4, A-2	0	90-100	60-85	50-65	20-40	20-30	NP-5
	20-47	Extremely cobbly loam.	GM, SM	A-1, A-2	55-65	50-70	30-50	25-45	20-35	30-40	NP-5
	47-60	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam.	GM	A-1	55-60	35-50	15-35	15-25	10-20	30-40	NP-5
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
222-------------- Histic Cryaquepts	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-95	60-80	20-30	---	NP
	15-28	Sapric material	PT	A-8	---	---	---	---	---	---	---
	28-36	Loamy sand-------	SM	A-4, A-2	0	100	90-100	60-80	20-40	---	NP
	36-46	Gravelly sandy loam, sandy loam, very gravelly sandy loam.	SM, GM	A-1, A-2, A-4	0	60-90	40-85	30-60	15-40	---	NP
	46-50	Sapric material	PT	A-8	---	---	---	---	---	---	---
	50-60	Gravelly coarse sand, very gravelly coarse sand.	SP-SM	A-1	0	80-90	45-70	20-30	5-10	---	NP
223-------------- Lonestar	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-17	Cindery sandy loam.	SM	A-1, A-2	0	80-90	50-75	40-65	20-35	25-35	NP-5
	17-29	Cindery sandy loam, sandy loam.	SM	A-1, A-2	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	29-43	Cindery loamy sand, loamy sand, gravelly sand.	SM, SP-SM	A-1	0-5	70-90	50-85	20-40	5-20	---	---
	43-60	Gravelly loam, gravelly sandy loam.	ML, SM	A-1, A-2, A-4	0-5	70-90	60-75	35-70	20-55	30-40	NP-5

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticit index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
224-------------- Lonestar	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-17	Cindery sandy loam.	SM	A-1, A-2	0	80-90	50-75	40-65	20-35	25-35	NP-5
	17-29	Cindery sandy loam, sandy loam.	SM	A-1, A-2	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	29-43	Cindery loamy sand, loamy sand, gravelly sand.	SM, SP-SM	A-1	0-5	70-90	50-85	20-40	5-20	---	---
	43-60	Gravelly loam, gravelly sandy loam.	ML, SM	A-1, A-2, A-4	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
225-------------- Lonestar	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-22	Cindery sandy loam.	SM	A-1, A-2	0	80-90	50-75	40-65	20-35	25-35	NP-5
	22-29	Cindery sandy loam, sandy loam.	SM	A-1, A-2	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	29-43	Cindery loamy sand, loamy sand, gravelly sand.	SM, SP-SM	A-1	0-5	70-90	50-85	20-40	5-20	---	---
	43-60	Gravelly loam, gravelly sandy loam.	ML, SM	A-1, A-2, A-4	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
226, 227--------- Minniepeak	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-18	Cindery sandy loam.	SM	A-1, A-2	0	80-90	65-75	40-50	20-30	30-40	NP-5
	18-23	Loamy sand, sandy loam.	SM	A-1, A-2	0	100	85-100	45-75	15-30	30-40	NP-5
	23-60	Very cindery sandy loam, extremely cindery sand, extremely cindery coarse sand.	SP	A-1	0-5	75-85	10-45	5-30	0-5	---	NP
228, 229--------- Minniepeak	0-4	Extremely cindery loamy sand.	SP-SM	A-1	0	70-80	15-25	10-20	5-10	---	NP
	4-14	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-17	Cindery sandy loam.	SM	A-1, A-2	0	80-90	65-75	40-50	20-30	30-40	NP-5
	17-22	Sandy loam, loamy sand.	SM	A-1, A-2	0	100	85-100	45-75	15-30	30-40	NP-5
	22-60	Very cindery sandy loam, extremely cindery sand, extremely cindery coarse sand.	SP	A-1	0-5	75-85	10-45	5-30	0-5	---	NP

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
230-------------- Obscurity	0-20	Very bouldery sand.	SP-SM	A-1	15-25	60-80	50-70	25-50	5-10	---	NP
	20-60	Very cobbly loamy sand, very cobbly sand.	SP-SM, SM	A-1	30-65	65-75	60-70	35-50	5-20	---	NP
231-------------- Panhandle	0-10	Extremely cindery loamy sand.	SP	A-1	0	60-90	15-25	10-20	0-5	---	NP
	10-60	Very cindery loamy sand.	SP-SM	A-1	0	60-90	30-50	15-30	5-10	---	NP
232, 233, 234---- Pelee	0-4	Extremely cindery loamy sand.	SP-SM	A-1	0	70-80	15-25	10-20	5-10	---	NP
	4-14	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	30-75	25-45	5-15	---	NP
	14-21	Sandy loam-------	SM	A-4, A-2	0	95-100	90-100	60-70	30-40	25-35	NP-5
	21-46	Extremely cindery sand, very cindery sand, very cindery coarse sand.	SP	A-1	0	50-70	15-30	10-15	0-5	---	NP
	46-60	Sandy loam, loamy sand.	SM	A-1, A-2, A-4	0	95-100	90-100	45-75	15-40	30-40	NP-5
235*:											
Pelee-----------	0-4	Extremely cindery loamy sand.	SP-SM	A-1	0	70-80	15-25	10-20	5-10	---	NP
	4-14	Very cindery sand, cindery sand, very cindery loamy sand.	SM, SP-SM, SP	A-1	0	70-90	30-75	25-45	5-15	---	NP
	14-21	Sandy loam-------	SM	A-4, A-2	0	95-100	90-100	60-70	30-40	25-35	NP-5
	21-46	Extremely cindery sand, very cindery sand, very cindery coarse sand.	SP	A-1	0	50-70	15-30	10-15	0-5	---	NP
	46-60	Sandy loam, loamy sand.	SM	A-1, A-2, A-4	0	95-100	90-100	45-75	15-40	30-40	NP-5
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
236-------------- Polepatch	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-27	Extremely bouldery loamy sand.	SM, GM	A-1	25-50	55-80	40-65	20-50	10-20	---	NP
	27-60	Extremely bouldery loamy sand, very cobbly loamy sand.	GP	A-1	40-70	20-50	10-45	5-30	0-5	---	NP

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas tici inde
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
237*:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cattcreek-------	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-95	60-80	20-30	---	NP
	15-21	Very cindery loamy sand.	SM, SP-SM	A-1	0	75-90	25-50	15-30	5-15	---	NP
	21-30	Very cindery sand, very gravelly loamy sand.	SP-SM, SP	A-1	0	70-90	10-25	5-20	0-5	---	NP
	30-45	Extremely cindery sand.	SP	A-1	0	70-90	10-25	5-20	0-5	---	NP
	45-60	Very gravelly sandy loam, extremely gravelly loam.	GM, GP-GM	A-1, A-2	25-35	20-35	10-35	10-20	5-20	35-45	NP-1
238, 239--------- Shoestring	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-25	Fine sandy loam, sandy loam.	ML, SM	A-4	0	90-100	85-100	60-85	35-55	---	NP
	25-28	Very gravelly sand, gravelly sand.	SP	A-1	0	70-80	40-55	5-15	0-5	---	NP
	28-39	Sandy loam, loamy sand.	SM	A-1, A-2, A-4	0	100	90-100	45-75	15-40	30-40	NP-5
	39-60	Very gravelly sand, very cobbly sand.	SP, GP, SP-SM, GP-GM	A-1	20-30	45-75	35-55	20-40	0-10	---	NP
240, 241, 242, 243, 244, 245--- Sinnice	0-4	Extremely cindery loamy sand.	SP, SP-SM	A-1	0	70-80	15-25	10-15	0-10	---	NP
	4-14	Very cindery sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-21	Extremely cindery loamy sand.	GP-GM	A-1	0	25-40	15-25	10-20	5-10	---	NP
	21-29	Loamy sand, sandy loam, fine sandy loam.	ML, SM	A-1, A-2, A-4	0	85-100	75-100	40-85	20-55	30-40	NP-5
	29-60	Extremely cindery sand.	GP	A-1	0	20-40	10-25	5-20	0-5	---	NP

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
246*:											
Sinnice----------	0-4	Extremely gravelly loamy sand.	SP, SP-SM	A-1	0	70-80	15-25	10-15	0-10	---	NP
	4-14	Very gravelly sand, gravelly sand, very gravelly loamy sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-21	Extremely gravelly loamy sand.	GP-GM	A-1	0	25-40	15-25	10-20	5-10	---	NP
	21-29	Loamy sand, sandy loam, fine sandy loam.	ML, SM	A-1, A-2, A-4	0	85-100	75-100	40-85	20-55	30-40	NP-5
	29-60	Extremely gravelly sand.	GP	A-1	0	20-40	10-25	5-20	0-5	---	NP
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
247*:											
Sinnice----------	0-15	Loamy sand--------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-22	Extremely cindery loamy sand.	GP-GM	A-1	0	25-40	15-25	10-20	5-10	---	NP
	22-30	Loamy sand, sandy loam, fine sandy loam.	ML, SM	A-1, A-2, A-4	0	85-100	75-100	40-85	20-55	30-40	NP-5
	30-60	Extremely cindery sand.	GP	A-1	0	20-40	10-25	5-20	0-5	---	NP
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
248*------------- Studebaker	0-6	Very gravelly loamy sand.	GM, SM	A-1	10-25	50-65	40-55	10-25	10-15	---	NP
	6-60	Very gravelly loamy sand, extremely gravelly loamy sand, extremely cobbly sand.	GP, GP-GM	A-1	25-50	20-50	20-50	10-20	0-10	---	NP
249-------------- Swift	0-15	Loamy sand--------	SM	A-2	0-5	90-100	80-90	50-75	15-25	---	NP
	15-20	Sandy loam--------	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	15-25	NP-5
	20-27	Cindery sandy loam, cindery silt loam.	SM	A-2, A-4, A-1	0	70-85	50-75	35-55	20-40	15-25	NP-5
	27-42	Very cindery loam, very gravelly sandy loam.	SM	A-1, A-2	0	70-90	35-50	25-45	10-35	---	NP
	42-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam.	SM, GM	A-1, A-2, A-4	30-50	35-70	25-60	20-50	15-45	30-40	NP-5

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticit index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
250*:											
Swift-----------	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	15-25	---	NP
	15-20	Sandy loam-------	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	15-25	NP-5
	20-27	Cindery sandy loam, cindery silt loam.	SM	A-2, A-4, A-1	0	70-85	50-75	35-55	20-40	15-25	NP-5
	27-42	Very cindery loam, very cindery sandy loam.	SM	A-1, A-2	0	70-90	35-50	25-45	10-35	---	NP
	42-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam.	SM, GM	A-1, A-2, A-4	30-50	35-70	25-60	20-50	15-45	30-40	NP-5
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
251, 252, 253, 254, 255, 256--- Tradedollar	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-20	Sandy loam-------	SM	A-2, A-4	0	95-100	85-100	55-70	30-40	---	NP
	20-41	Cindery sandy loam, very gravelly sandy loam.	SM	A-1, A-2	0	80-95	30-75	20-50	10-30	---	NP
	41-60	Extremely cindery sand, extremely cindery loamy sand.	SP	A-1	0	80-95	5-25	0-15	0-5	---	NP
257, 258, 259, 260, 261-------- Vanson	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-31	Sandy loam-------	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	---	NP
	31-39	Very gravelly loamy sand, gravelly sandy loam, loamy sand.	SM	A-1, A-2	0	75-90	40-90	30-50	10-30	---	NP
	39-60	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam.	GM	A-1, A-2	20-45	30-60	20-50	15-40	10-35	30-50	NP-10

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
262-------------- Vanson	0-4	Extremely cindery loamy sand.	SP, SP-SM	A-1	0-10	70-80	15-25	5-15	0-10	---	NP
	4-14	Very cindery sand, very gravelly loamy sand, gravelly sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-30	Sandy loam-------	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	---	NP
	30-38	Very gravelly loamy sand, gravelly sandy loam, loamy sand.	SM	A-1, A-2	0	75-90	40-90	30-50	10-30	---	NP
	38-60	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam.	GM	A-1, A-2	20-45	30-60	20-50	15-40	10-35	30-50	NP-10
263*:											
Vanson----------	0-4	Extremely cindery loamy sand.	SP, SP-SM	A-1	0-10	70-80	15-25	5-15	0-10	---	NP
	4-14	Very cindery sand, very gravelly loamy sand, gravelly sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-30	Sandy loam-------	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	---	NP
	30-38	Very gravelly loamy sand, gravelly sandy loam, loamy sand.	SM	A-1, A-2	0	75-90	40-90	30-50	10-30	---	NP
	38-60	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam.	GM	A-1, A-2	20-45	30-60	20-50	15-40	10-35	30-50	NP-10
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
264*:											
Vanson----------	0-15	Loamy sand-------	SM	A-2	0-5	90-100	80-90	50-75	20-30	---	NP
	15-31	Sandy loam-------	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	---	NP
	31-39	Very gravelly loamy sand, gravelly sandy loam, loamy sand.	SM	A-1, A-2	0	75-90	40-90	30-50	10-30	---	NP
	39-60	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam.	GM	A-1, A-2	20-45	30-60	20-50	15-40	10-35	30-50	NP-10

See footnote at end of table.

TABLE 13B.--ENGINEERING INDEX PROPERTIES (POSTERUPTION)--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticit index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
264*:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
265*:											
Vanson----------	0-4	Extremely cindery loamy sand.	SP, SP-SM	A-1	0-10	70-80	15-25	5-15	0-10	---	NP
	4-14	Very cindery sand, very gravelly loamy sand, gravelly sand.	SM, SP-SM, SP	A-1	0	70-90	35-85	25-45	0-15	---	NP
	14-30	Sandy loam-------	SM	A-4, A-2	0	90-100	75-95	55-70	25-40	---	NP
	30-38	Very gravelly loamy sand, gravelly sandy loam, loamy sand.	SM	A-1, A-2	0	75-90	40-90	30-50	10-30	---	NP
	38-60	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam.	GM	A-1, A-2	20-45	30-60	20-50	15-40	10-35	30-50	NP-10
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
266-------------- Wakepish	0-30	Very gravelly sandy loam.	GM	A-1	0-25	40-60	30-50	20-35	10-20	---	NP
	30-60	Very gravelly loamy sand, very gravelly sand, extremely gravelly loamy sand.	SP, SP-SM	A-1	0-40	60-70	30-50	15-35	0-10	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14A.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (PREERUPTION)

The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
	0-17	0.6-2.0	0.12-0.16	5.6-6.0	Low	0.20	5	5-10
Andic	17-23	0.6-2.0	0.13-0.17	5.6-6.0	Low	0.20		
Cryumbrepts	23-39	0.6-2.0	0.09-0.13	5.6-6.0	Moderate	0.10		
	39-60	0.6-2.0	0.13-0.17	5.6-6.0	Moderate	0.17		
	0-24	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.20	5	0-2
Arents	24-60	0.6-6.0	0.05-0.12	5.6-6.5	Low	0.05		
, 4	0-12	0.6-2.0	0.08-0.10	5.1-6.0	Low	0.15	5	2-3
Aschoff	12-47	0.6-2.0	0.08-0.12	5.1-6.0	Low	0.10		
	47-60	0.6-2.0	0.08-0.10	5.1-6.0	Low	0.10		
*:								
Aschoff	0-12	0.6-2.0	0.08-0.10	5.1-6.0	Low	0.15	5	2-3
	12-47	0.6-2.0	0.08-0.12	5.1-6.0	Low	0.10		
	47-60	0.6-2.0	0.08-0.10	5.1-6.0	Low	0.10		
Rock outcrop	0-60	---	---	---	---	---	---	---
*	0-60	---	---	---	---	---	---	---
Badland								
7, 8	0-7	2.0-6.0	0.10-0.12	5.6-6.5	Low	0.17	2	<2
Bandid	7-15	2.0-6.0	0.10-0.12	5.6-6.5	Low	0.17		
	15-60	>20	0.05-0.08	5.6-6.5	Low	0.02		
, 10, 11	0-5	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.17	2	<2
Bandid	5-15	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.17		
	15-27	>20	0.05-0.08	5.6-6.5	Low	0.02		
	27-60	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.15		
2, 13, 14	0-4	2.0-6.0	0.11-0.13	5.6-6.5	Low	0.15	4	1-3
Bannel	4-10	>20	0.03-0.07	5.6-6.5	Low	0.10		
	10-50	2.0-6.0	0.11-0.15	5.6-7.3	Low	0.24		
	50-60	>20	0.03-0.07	6.1-7.3	Low	0.15		
5, 16	0-6	2.0-6.0	0.11-0.13	5.6-6.5	Low	0.10	5	5-10
Benham	6-28	6.0-20	0.07-0.11	5.6-6.5	Low	0.05		
	28-38	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.15		
	38-60	>20	0.07-0.11	5.6-6.5	Low	0.02		
7	0-6	2.0-6.0	0.08-0.10	5.6-6.0	Low	0.10	5	1-2
Bonneville	6-12	2.0-6.0	0.06-0.08	5.6-6.0	Low	0.05		
	12-60	>20	0.03-0.05	5.6-6.5	Low	0.02		
8, 19, 20	0-6	6.0-20	0.08-0.12	5.6-6.5	Low	0.10	3	3-8
Cattcreek	6-15	6.0-20	0.07-0.11	5.6-6.5	Low	0.05		
	15-30	>20	0.06-0.10	5.6-6.5	Low	0.02		
	30-54	0.6-2.0	0.05-0.10	5.6-6.5	Low	0.05		
	54	---	---	---	---	---		
1, 22, 23, 24	0-14	0.6-2.0	0.16-0.19	6.1-7.3	Low	0.43	5	2-3
Chemawa	14-60	0.6-2.0	0.16-0.21	5.6-7.3	Low	0.49		

See footnote at end of table.

TABLE 14A.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (PREERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
25, 26, 27------- Cinnamon	0-3	0.6-2.0	0.11-0.15	6.1-7.3	Low--------------	0.20	5	2-3
	3-22	0.6-2.0	0.08-0.13	6.1-7.3	Low--------------	0.20		
	22-60	0.6-2.0	0.11-0.18	5.6-6.5	Low--------------	0.24		
28, 29, 30, 31, 32, 33---------- Colter	0-6	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.15	5	5-10
	6-33	>20	0.07-0.11	5.6-6.5	Low--------------	0.05		
	33-54	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.17		
	54-60	>20	0.06-0.10	5.6-6.5	Low--------------	0.02		
34*:								
Colter----------	0-6	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.15	5	5-10
	6-33	>20	0.07-0.11	5.6-6.5	Low--------------	0.05		
	33-54	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.17		
	54-60	>20	0.06-0.10	5.6-6.5	Low--------------	0.02		
Rock outcrop----	0-60	---	---	---	----------------	---	---	---
35--------------- Cryandepts	0-13	0.6-2.0	0.08-0.11	5.6-6.0	Low--------------	0.20	4	2-5
	13-60	0.6-2.0	0.04-0.10	5.6-6.0	Low--------------	0.15		
36, 37----------- Dougan	0-11	2.0-6.0	0.08-0.12	5.1-6.0	Low--------------	0.15	2	1-2
	11-24	2.0-6.0	0.06-0.08	4.5-5.5	Low--------------	0.15		
	24-39	2.0-6.0	0.05-0.08	4.5-5.0	Low--------------	0.10		
	39	---	---	---	----------------	---		
38, 39, 40------- Forsyth	0-8	2.0-6.0	0.10-0.14	5.6-7.3	Low--------------	0.10	5	<2
	8-60	6.0-20	0.04-0.08	5.6-7.3	Low--------------	0.02		
41--------------- Fortran	0-3	2.0-6.0	0.06-0.08	5.6-6.5	Low--------------	0.15	2	2-3
	3-11	0.6-2.0	0.07-0.10	5.6-6.5	Low--------------	0.15		
	11-17	2.0-6.0	0.06-0.08	5.6-6.5	Low--------------	0.10		
	17-60	6.0-20	0.04-0.06	5.6-6.5	Low--------------	0.05		
42--------------- Haplumbrepts	0-3	0.6-2.0	0.10-0.14	6.1-6.5	Low--------------	0.24	3	2-3
	3-8	0.6-2.0	0.13-0.17	6.1-6.5	Moderate---------	0.20		
	8-15	0.6-2.0	0.11-0.15	6.1-6.5	Moderate---------	0.20		
	15-30	0.6-2.0	0.06-0.10	5.6-6.0	Moderate---------	0.20		
	30-60	0.6-2.0	0.06-0.10	5.6-6.0	Low--------------	0.05		
43, 44, 45, 46--- Hatchet	0-3	0.6-2.0	0.06-0.09	5.6-6.5	Low--------------	0.15	2	1-5
	3-10	0.6-2.0	0.06-0.09	5.6-6.5	Low--------------	0.20		
	10-20	0.6-2.0	0.03-0.06	5.6-6.5	Low--------------	0.05		
	20-28	0.6-2.0	0.03-0.07	5.6-6.5	Low--------------	0.05		
	28	---	---	---	----------------	---		
47*, 48*, 49*:								
Hatchet---------	0-3	0.6-2.0	0.06-0.09	5.6-6.5	Low--------------	0.15	2	1-5
	3-10	0.6-2.0	0.06-0.09	5.6-6.5	Low--------------	0.20		
	10-20	0.6-2.0	0.03-0.06	5.6-6.5	Low--------------	0.05		
	20-28	0.6-2.0	0.03-0.07	5.6-6.5	Low--------------	0.05		
	28	---	---	---	----------------	---		
Rock outcrop----	0-60	---	---	---	----------------	---	---	---
50, 51, 52------- Hesson	0-19	0.2-0.6	0.19-0.21	4.5-6.0	Low--------------	0.32	5	2-3
	19-60	0.06-0.2	0.14-0.21	4.5-5.5	Moderate---------	0.23		

See footnote at end of table.

TABLE 14A.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (PREERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
53---------------- Histic Cryaquepts	0-13	0.6-2.0	0.30-0.40	5.1-5.5	Low---------------	0.00	5	40-70
	13-21	6.0-20.0	0.06-0.10	5.6-6.0	Low---------------	0.17		
	21-31	2.0-6.0	0.08-0.12	5.6-6.0	Low---------------	0.15		
	31-35	0.6-2.0	0.30-0.40	5.1-5.5	Low---------------	0.00		
	35-60	>20	0.02-0.06	5.6-6.0	Low---------------	0.05		
54, 55------------ Hoffstadt	0-4	0.6-2.0	0.05-0.09	5.6-6.5	Low---------------	0.10	3	1-5
	4-36	0.6-2.0	0.05-0.09	5.6-6.5	Low---------------	0.10		
	36-55	0.6-2.0	0.03-0.05	5.6-6.5	Low---------------	0.05		
	55	---	---	---	------------------	---		
56---------------- Hood	0-8	0.6-2.0	0.19-0.21	5.6-6.5	Low---------------	0.43	5	2-5
	8-60	0.6-2.0	0.19-0.21	5.6-6.5	Low---------------	0.55		
57, 58, 59-------- Kinney	0-12	0.6-2.0	0.16-0.18	5.1-6.5	Low---------------	0.37	5	4-8
	12-28	0.6-2.0	0.16-0.21	4.5-5.5	Low---------------	0.24		
	28-60	0.6-2.0	0.15-0.18	4.5-5.5	Low---------------	0.24		
60---------------- Lithic Umbric Vitrandepts	0-2	2.0-6.0	0.09-0.13	5.6-6.0	Low---------------	0.17	1	5-10
	2-6	6.0-20	0.02-0.06	5.6-6.0	Low---------------	0.10		
	6	---	---	---	------------------	---		
1, 62, 63-------- Lonestar	0-7	0.6-2.0	0.13-0.18	5.6-6.5	Low---------------	0.15	5	6-8
	7-14	0.6-2.0	0.11-0.15	5.6-6.5	Low---------------	0.15		
	14-28	2.0-6.0	0.08-0.12	6.1-7.3	Low---------------	0.15		
	28-51	0.6-2.0	0.11-0.18	5.6-6.5	Low---------------	0.32		
	51-60	0.6-2.0	0.16-0.21	5.1-5.5	Low---------------	0.32		
4---------------- McBee	0-13	0.6-2.0	0.19-0.21	5.6-6.5	Low---------------	0.43	5	3-4
	13-43	0.6-2.0	0.16-0.21	5.6-6.5	Moderate----------	0.43		
	43-60	0.6-2.0	0.19-0.21	5.6-6.5	Low---------------	0.43		
5---------------- McDoug	0-12	0.6-2.0	0.19-0.21	5.6-6.5	Low---------------	0.43	5	3-4
	12-38	0.6-2.0	0.15-0.20	5.6-6.5	Moderate----------	0.37		
	38-60	0.6-2.0	0.10-0.18	5.6-6.5	Moderate----------	0.32		
, 67, 68-------- McElroy	0-10	0.6-2.0	0.12-0.14	5.6-6.5	Low---------------	0.20	5	2-3
	10-60	0.6-2.0	0.05-0.10	5.6-6.5	Low---------------	0.10		
---------------- McElroy	0-10	0.6-2.0	0.09-0.12	5.6-6.5	Low---------------	0.15	5	1-2
	10-60	0.6-2.0	0.03-0.05	5.6-6.0	Low---------------	0.15		
, 71, 72-------- Minniepeak	0-3	2.0-6.0	0.09-0.13	5.6-6.5	Low---------------	0.15	5	1-2
	3-8	2.0-6.0	0.08-0.11	5.6-6.5	Low---------------	0.20		
	8-60	6.0-20	0.04-0.06	5.6-6.5	Low---------------	0.10		
, 74------------ Mossyrock	0-27	0.6-2.0	0.21-0.25	5.6-6.5	Low---------------	0.28	5	5-15
	27-60	0.6-2.0	0.18-0.22	5.1-7.3	Low---------------	0.32		
, 76, 77-------- Mountzion	0-17	0.6-2.0	0.19-0.21	5.1-6.0	Moderate----------	0.28	5	1-2
	17-60	0.6-2.0	0.17-0.21	4.5-5.5	Moderate----------	0.24		
, 79, 80-------- elee	0-7	2.0-6.0	0.11-0.15	5.6-6.5	Low---------------	0.20	5	1-3
	7-32	>20	0.04-0.07	5.6-6.5	Low---------------	0.02		
	32-60	2.0-6.0	0.11-0.15	5.6-6.5	Low---------------	0.20		
*:								
elee------------	0-7	2.0-6.0	0.11-0.15	5.6-6.5	Low---------------	0.20	5	1-3
	7-32	>20	0.04-0.07	5.6-6.5	Low---------------	0.02		
	32-60	2.0-6.0	0.11-0.15	5.6-6.5	Low---------------	0.20		

See footnote at end of table.

TABLE 14A.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (PREERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
81*:								
Rock outcrop	0-60	---	---	---	---	---	---	---
82 Pilchuck	0-9	2.0-6.0	0.15-0.17	5.6-6.5	Low	0.37	5	1-2
	9-46	6.0-20	0.05-0.08	5.6-7.3	Low	0.10		
	46-60	2.0-6.0	0.12-0.15	5.6-6.5	Low	0.32		
83 Pillery	0-9	2.0-6.0	0.10-0.14	5.6-6.0	Low	0.32	3	1-2
	9-20	2.0-6.0	0.15-0.19	5.6-6.0	Low	0.37		
	20-45	2.0-6.0	0.11-0.14	5.1-5.5	Low	0.32		
	45-60	>20	0.05-0.08	5.6-6.0	Low	0.17		
84, 85 Pinchot	0-6	0.6-2.0	0.11-0.15	5.6-6.5	Low	0.15	2	1-2
	6-34	0.6-2.0	0.11-0.13	5.6-6.5	Low	0.15		
	34-60	6.0-20	0.03-0.05	5.6-6.5	Low	0.02		
86 Pinoty	0-6	0.6-2.0	0.11-0.15	6.1-7.3	Low	0.20	3	1-2
	6-21	2.0-6.0	0.08-0.15	6.1-7.3	Low	0.20		
	21-30	0.6-2.0	0.12-0.15	6.1-7.3	Low	0.20		
	30-45	0.6-2.0	0.10-0.13	6.1-7.3	Low	0.20		
	45-60	6.0-20	0.03-0.08	6.1-7.3	Low	0.10		
87* Pits	0-10	>6.0	0.03-0.05	---	Low	0.17	5	<.1
	10-60	>6.0	0.02-0.05	---	Low	0.15		
88, 89 Polepatch	0-12	6.0-20	0.03-0.05	5.6-6.5	Low	0.10	5	1-2
	12-60	6.0-20	0.03-0.05	5.6-6.5	Low	0.02		
90* Riverwash	0-6	>6.0	0.03-0.04	---	Low	---	---	<.1
	6-60	>6.0	0.02-0.03	---	Low	---		
91*:								
Rock outcrop	0-60	---	---	---	---	---	---	---
Cattcreek	0-6	6.0-20	0.08-0.12	5.6-6.5	Low	0.10	3	3-8
	6-15	6.0-20	0.07-0.11	5.6-6.5	Low	0.05		
	15-30	>20	0.06-0.10	5.6-6.5	Low	0.02		
	30-54	0.6-2.0	0.05-0.10	5.6-6.5	Low	0.05		
	54	---	---	---	---	---		
92*:								
Rock outcrop	0-60	---	---	---	---	---	---	---
Rubble land	0-60	>20	0.-0.1	---	Low	---	---	<.1
93*:								
Rock outcrop	0-60	---	---	---	---	---	---	---
Xerorthents	0-6	0.6-2.0	0.11-0.15	6.1-6.5	Low	0.20	2	.5-1
	6-31	2.0-6.0	0.08-0.12	6.1-6.5	Low	0.10		
	31	---	---	---	---	---		
94, 95 Shoestring	0-5	0.6-2.0	0.13-0.18	5.1-6.0	Low	0.24	2	3-4
	5-8	0.6-2.0	0.05-0.08	5.6-6.5	Low	0.02		
	8-24	0.6-2.0	0.11-0.15	5.6-6.5	Low	0.20		
	24-60	6.0-20	0.04-0.06	5.6-6.5	Low	0.05		
96, 97, 98, 99, 100, 101 Sinnice	0-7	>20	0.06-0.11	5.6-6.5	Low	0.05	3	1-2
	7-15	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.20		
	15-60	>20	0.06-0.11	5.6-6.5	Low	0.02		

See footnote at end of table.

TABLE 14A.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (PREERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	In/hr	In/in	pH				Pct
102*: Sinnice	0-7	>20	0.06-0.11	5.6-6.5	Low	0.05	3	1-2
	7-15	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.20		
	15-60	>20	0.06-0.11	5.6-6.5	Low	0.02		
Rock outcrop	0-60	---	---	---	---	---	---	---
103, 104, 105, 106 Skamania	0-10	2.0-6.0	0.15-0.17	5.6-6.5	Low	0.37	5	1-2
	10-43	0.6-2.0	0.10-0.15	5.6-6.5	Low	0.43		
	43-60	2.0-6.0	0.08-0.12	5.6-6.5	Low	0.37		
107, 108 Skelida	0-15	0.6-2.0	0.19-0.21	5.6-6.0	Low	0.37	5	2-3
	15-60	0.6-2.0	0.19-0.21	5.6-6.0	Low	0.37		
109, 110, 111 Skoly	0-5	0.6-2.0	0.16-0.18	5.1-5.5	Low	0.20	5	2-3
	5-40	0.6-2.0	0.08-0.14	5.1-5.5	Moderate	0.15		
	40-60	0.6-2.0	0.06-0.09	5.1-5.5	Moderate	0.10		
112*, 113*: Skoly	0-5	0.6-2.0	0.16-0.18	5.1-5.5	Low	0.20	5	2-3
	5-40	0.6-2.0	0.08-0.14	5.1-5.5	Moderate	0.15		
	40-60	0.6-2.0	0.06-0.09	5.1-5.5	Moderate	0.10		
Rock outcrop	0-60	---	---	---	---	---	---	---
114 St. Helens	0-6	0.6-2.0	0.11-0.15	5.6-6.0	Low	0.20	2	1-2
	6-9	6.0-20	0.06-0.08	5.6-6.5	Low	0.02		
	9-18	0.6-2.0	0.11-0.18	5.6-6.5	Low	0.05		
	18-28	2.0-6.0	0.06-0.11	5.6-6.5	Low	0.17		
	28-60	6.0-20	0.03-0.08	5.6-6.5	Low	0.05		
115, 116, 117, 118 St. Martin	0-4	0.2-0.6	0.13-0.17	6.1-7.3	Moderate	0.20	5	7-12
	4-11	0.06-0.2	0.14-0.18	5.6-6.5	High	0.28		
	11-60	0.06-0.2	0.12-0.16	5.6-6.5	High	0.17		
119 Stabbart	0-13	0.6-2.0	0.19-0.21	5.1-5.5	Moderate	0.32	5	2-3
	13-37	0.2-0.6	0.19-0.21	5.1-5.5	Moderate	0.32		
	37-60	0.2-0.6	0.18-0.20	5.1-5.5	Moderate	0.32		
120, 121, 122 Stabler	0-9	0.6-2.0	0.16-0.18	5.6-6.5	Low	0.37	5	1-2
	9-37	0.6-2.0	0.16-0.21	5.6-6.5	Low	0.43		
	37-60	2.0-6.0	0.11-0.13	5.6-6.5	Low	0.43		
123, 124 Steever	0-5	0.6-2.0	0.10-0.19	5.1-6.0	Moderate	0.20	5	1-2
	5-12	0.6-2.0	0.10-0.19	5.1-6.0	Moderate	0.15		
	12-60	0.6-2.0	0.09-0.12	5.1-6.0	Moderate	0.15		
125*, 126*: Steever	0-5	0.6-2.0	0.10-0.19	5.1-6.0	Moderate	0.20	5	1-2
	5-12	0.6-2.0	0.10-0.19	5.1-6.0	Moderate	0.15		
	12-60	0.6-2.0	0.09-0.12	5.1-6.0	Moderate	0.15		
Rock outcrop	0-60	---	---	---	---	---	---	---
127, 128, 129 Stevenson	0-11	0.6-2.0	0.19-0.21	5.6-6.0	Moderate	0.43	5	1-2
	11-37	0.6-2.0	0.16-0.21	5.1-6.0	Moderate	0.49		
	37-60	0.6-2.0	0.13-0.20	5.1-6.0	Moderate	0.24		

See footnote at end of table.

TABLE 14A.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (PREERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	In/hr	In/in	pH				Pct
130, 131, 132---- Swift	0-12	0.6-2.0	0.11-0.13	5.6-6.5	Low---------------	0.15	5	2-3
	12-27	0.6-2.0	0.06-0.08	5.6-6.5	Low---------------	0.20		
	27-60	0.6-2.0	0.10-0.12	5.6-6.5	Low---------------	0.10		
133*, 134*: Swift-----------	0-12	0.6-2.0	0.11-0.13	5.6-6.5	Low---------------	0.15	5	2-3
	12-27	0.6-2.0	0.06-0.08	5.6-6.5	Low---------------	0.20		
	27-60	0.6-2.0	0.10-0.12	5.6-6.5	Low---------------	0.10		
Rock outcrop----	0-60	---	---	---	-----------------	---	---	---
135, 136--------- Timberhead	0-10	0.6-2.0	0.09-0.14	5.6-6.0	Low---------------	0.20	5	2-3
	10-40	0.6-2.0	0.09-0.12	5.1-6.0	Low---------------	0.24		
	40-60	0.6-2.0	0.16-0.18	5.1-6.0	Low---------------	0.43		
137, 138, 139, 140, 141, 142--- Tradedollar	0-5	0.6-2.0	0.11-0.15	5.1-6.0	Low---------------	0.20	5	1-5
	5-26	2.0-6.0	0.11-0.15	5.1-6.0	Low---------------	0.10		
	26-42	>20	0.06-0.10	5.1-6.0	Low---------------	0.02		
	42-60	2.0-6.0	0.09-0.13	5.1-6.0	Low---------------	0.15		
143-------------- Typic Dystrandepts	0-10	0.6-2.0	0.19-0.21	6.1-6.5	Low---------------	0.32	5	2-3
	10-41	0.6-2.0	0.07-0.11	5.6-6.0	Low---------------	0.05		
	41-60	0.6-2.0	0.11-0.15	5.6-6.0	Low---------------	0.10		
144, 145, 146---- Underwood	0-5	0.6-2.0	0.16-0.18	6.1-6.5	Low---------------	0.37	5	2-5
	5-35	0.2-0.6	0.19-0.21	5.1-6.5	Moderate----------	0.28		
	35-60	0.6-2.0	0.16-0.21	5.1-6.0	Low---------------	0.32		
147, 148--------- Undusk	0-15	0.6-2.0	0.15-0.18	6.1-7.3	Low---------------	0.24	5	1-2
	15-60	0.6-2.0	0.10-0.12	6.1-7.3	Low---------------	0.10		
149, 150, 151, 152, 153-------- Vanson	0-16	2.0-6.0	0.11-0.13	5.1-6.5	Low---------------	0.28	3	1-5
	16-24	2.0-6.0	0.09-0.13	6.1-7.3	Low---------------	0.28		
	24-45	0.6-2.0	0.07-0.11	5.6-6.0	Low---------------	0.10		
	45	---	---	---	-----------------	---		
154*, 155*, 156*: Vanson----------	0-16	2.0-6.0	0.11-0.13	5.1-6.5	Low---------------	0.28	3	1-5
	16-24	2.0-6.0	0.09-0.13	6.1-7.3	Low---------------	0.28		
	24-45	0.6-2.0	0.07-0.11	5.6-6.0	Low---------------	0.10		
	45	---	---	---	-----------------	---		
Rock outcrop----	0-60	---	---	---	-----------------	---	---	---
157-------------- Washougal	0-5	2.0-6.0	0.16-0.18	4.5-5.5	Low---------------	0.32	2	2-3
	5-22	0.6-2.0	0.08-0.12	4.5-5.5	Low---------------	0.20		
	22-30	0.6-2.0	0.05-0.08	5.1-5.5	Low---------------	0.20		
	30-36	2.0-6.0	0.05-0.08	5.1-5.5	Low---------------	0.17		
	36-60	>20	0.02-0.04	5.1-5.5	Low---------------	0.02		
158, 159, 160---- Washougal	0-11	0.6-2.0	0.12-0.17	4.5-5.5	Low---------------	0.20	3	2-3
	11-44	0.6-2.0	0.05-0.08	5.1-5.5	Low---------------	0.10		
	44-60	2.0-6.0	0.05-0.08	5.1-5.5	Low---------------	0.10		
161*: Xerorthents-----	0-6	0.6-2.0	0.11-0.15	6.1-6.5	Low---------------	0.20	2	.5-1
	6-31	2.0-6.0	0.08-0.12	6.1-6.5	Low---------------	0.10		
	31	---	---	---	-----------------	---		

See footnote at end of table.

TABLE 14A.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (PREERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	In/hr	In/in	pH				Pct
161*:								
Rock outcrop----	0-60	---	---	---	------------------	---	---	---
162, 163, 164---- Yalelake	0-11	0.6-2.0	0.11-0.15	5.1-6.5	Low---------------	0.20	5	2-3
	11-20	0.6-2.0	0.08-0.15	5.6-7.3	Low---------------	0.15		
	20-39	0.6-2.0	0.11-0.15	5.6-7.3	Low---------------	0.20		
	39-60	0.6-2.0	0.15-0.18	5.6-7.3	Low---------------	0.15		
165, 166--------- Zygore	0-14	0.6-2.0	0.09-0.12	5.1-6.0	Low---------------	0.20	5	2-3
	14-37	0.6-2.0	0.08-0.10	5.1-5.5	Low---------------	0.15		
	37-60	0.6-2.0	0.08-0.10	4.5-5.5	Low---------------	0.10		
167*:								
Zygore----------	0-14	0.6-2.0	0.09-0.12	5.1-6.0	Low---------------	0.20	5	2-3
	14-37	0.6-2.0	0.08-0.10	5.1-5.5	Low---------------	0.15		
	37-60	0.6-2.0	0.08-0.10	4.5-5.5	Low---------------	0.10		
Rock outcrop----	0-60	---	---	---	------------------	---	---	---
168, 169, 170---- Zymer	0-4	0.6-2.0	0.11-0.15	5.6-6.5	Low---------------	0.32	3	2-4
	4-10	0.6-2.0	0.06-0.10	5.6-6.5	Low---------------	0.20		
	10-22	0.6-2.0	0.06-0.10	5.1-6.0	Low---------------	0.15		
	22-28	0.6-2.0	0.15-0.20	5.1-6.0	Low---------------	0.15		
	28-60	0.6-2.0	0.15-0.20	5.1-6.0	Low---------------	0.10		
171*, 172*:								
Zymer-----------	0-4	0.6-2.0	0.11-0.15	5.6-6.5	Low---------------	0.32	3	2-4
	4-10	0.6-2.0	0.06-0.10	5.6-6.5	Low---------------	0.20		
	10-22	0.6-2.0	0.06-0.10	5.1-6.0	Low---------------	0.15		
	22-28	0.6-2.0	0.15-0.20	5.1-6.0	Low---------------	0.15		
	28-60	0.6-2.0	0.15-0.20	5.1-6.0	Low---------------	0.10		
Rock outcrop----	0-60	---	---	---	------------------	---	---	---
173-------------- Zynbar	0-6	0.6-2.0	0.20-0.30	5.6-7.3	Low---------------	0.15	4	5-10
	6-47	0.6-2.0	0.20-0.35	5.6-7.3	Low---------------	0.28		
	47-60	0.2-0.6	0.08-0.13	5.1-6.0	Low---------------	0.10		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14B.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (POSTERUPTION)

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
200, 201	0-4	6.0-20	0.03-0.06	4.5-6.0	Low	0.05	3	<.5
Bandid	4-14	6.0-20	0.04-0.08	4.5-6.0	Low	0.10		
	14-17	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.17		
	17-33	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.17		
	33-44	>20	0.05-0.08	5.6-6.5	Low	0.02		
	44-60	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.15		
202	0-4	6.0-20	0.03-0.06	4.5-6.0	Low	0.05	3	<.5
Bandid	4-14	6.0-20	0.04-0.08	4.5-6.0	Low	0.10		
	14-23	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.17		
	23-33	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.17		
	33-44	>20	0.05-0.08	5.6-6.5	Low	0.02		
	44-60	2.0-6.0	0.08-0.13	5.6-6.5	Low	0.15		
203, 204	0-15	2.0-6.0	0.08-0.11	4.5-6.0	Low	0.17	5	<.2
Cattcreek	15-21	6.0-20	0.08-0.12	5.6-6.5	Low	0.10		
	21-30	>20	0.06-0.10	5.6-6.5	Low	0.05		
	30-45	>20	0.07-0.11	5.6-6.5	Low	0.05		
	45-60	0.6-2.0	0.06-0.10	5.6-6.5	Low	0.02		
205	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low	0.17	5	<.5
Cinnamon	15-18	0.6-2.0	0.11-0.15	6.1-7.3	Low	0.20		
	18-37	0.6-2.0	0.08-0.13	6.1-7.3	Low	0.20		
	37-60	0.6-2.0	0.11-0.18	5.6-6.5	Low	0.24		
206, 207, 208, 209, 210, 211	0-15	2.0-6.0	0.08-0.11	4.5-6.0	Low	0.17	5	<5
Colter	15-21	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.15		
	21-48	>20	0.07-0.11	5.6-6.5	Low	0.05		
	48-60	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.17		
212	0-4	6.0-20	0.02-0.05	4.5-6.0	Low	0.05	5	<.5
Colter	4-14	6.0-20	0.04-0.08	4.5-6.0	Low	0.10		
	14-20	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.15		
	20-47	>20	0.07-0.11	5.6-6.5	Low	0.05		
	47-60	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.17		
213*:								
Colter	0-15	2.0-6.0	0.08-0.11	4.5-6.0	Low	0.17	5	<5
	15-21	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.15		
	21-48	>20	0.07-0.11	5.6-6.5	Low	0.05		
	48-60	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.17		
Rock outcrop	0-60	---	---	---	---	---	---	---
214	0-4	6.0-20	0.02-0.05	4.5-6.0	Low	0.05	5	<.5
Cryandepts	4-14	6.0-20	0.04-0.08	4.5-6.0	Low	0.10		
	14-30	6.0-20	0.04-0.08	5.6-6.0	Low	0.15		
	30-60	0.6-2.0	0.04-0.10	5.6-6.0	Low	0.15		
215	0-6	2.0-6.0	0.06-0.09	4.5-6.0	Low	0.17	5	<.5
Elkprairie	6-17	2.0-6.0	0.03-0.05	4.5-6.0	Low	0.05		
	17-23	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.15		
	23-36	0.6-2.0	0.11-0.18	4.5-6.0	Low	0.32		
	36-60	0.6-2.0	0.20-0.30	5.1-7.3	Low	0.32		

See footnote at end of table.

TABLE 14B.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (POSTERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
216, 217, 218----	0-10	2.0-6.0	0.06-0.09	4.5-6.0	Low---------------	0.17	3	<.5
Hatchet	10-13	0.6-2.0	0.06-0.09	5.6-6.5	Low---------------	0.15		
	13-20	0.6-2.0	0.06-0.09	5.6-6.5	Low---------------	0.20		
	20-30	0.6-2.0	0.03-0.07	5.6-6.5	Low---------------	0.05		
	30-38	0.6-2.0	0.03-0.07	5.6-6.5	Low---------------	0.05		
	38	---	---	---	-----------------	---		
219*:								
Hatchet---------	0-4	6.0-20	0.03-0.06	4.5-6.0	Low---------------	0.05	2	<.5
	4-10	6.0-20	0.04-0.08	4.5-6.0	Low---------------	0.10		
	10-20	2.0-6.0	0.08-0.13	5.6-6.5	Low---------------	0.17		
	20-30	0.6-2.0	0.03-0.07	5.6-6.5	Low---------------	0.05		
	30-38	0.6-2.0	0.03-0.07	5.6-6.5	Low---------------	0.05		
	38	---	---	---	-----------------	---		
Rock outcrop----	0-60	---	---	---	-----------------	---	---	---
220*:								
Hatchet---------	0-10	2.0-6.0	0.06-0.09	4.5-6.0	Low---------------	0.17	3	<.5
	10-13	0.6-2.0	0.06-0.09	5.6-6.5	Low---------------	0.15		
	13-20	0.6-2.0	0.06-0.09	5.6-6.5	Low---------------	0.20		
	20-30	0.6-2.0	0.03-0.07	5.6-6.5	Low---------------	0.05		
	30-38	0.6-2.0	0.03-0.07	5.6-6.5	Low---------------	0.05		
	38	---	---	---	-----------------	---		
Rock outcrop----	0-60	---	---	---	-----------------	---	---	---
221*:								
Hatchet---------	0-4	6.0-20	0.03-0.06	4.5-6.0	Low---------------	0.05	2	<.5
	4-14	6.0-20	0.04-0.08	4.5-6.0	Low---------------	0.10		
	14-20	2.0-6.0	0.08-0.13	5.6-6.5	Low---------------	0.17		
	20-47	0.6-2.0	0.03-0.07	5.6-6.5	Low---------------	0.05		
	47-60	0.6-2.0	0.03-0.07	5.6-6.5	Low---------------	0.05		
Rock outcrop----	0-60	---	---	---	-----------------	---	---	---
222--------------	0-15	2.0-6.0	0.08-0.11	4.5-6.0	Low---------------	0.20	5	<.5
Histic	15-28	0.6-2.0	0.30-0.40	5.1-5.5	Low---------------	0.00		
Cryaquepts	28-36	6.0-20	0.06-0.10	5.6-6.0	Low---------------	0.17		
	36-46	2.0-6.0	0.08-0.12	5.6-6.0	Low---------------	0.15		
	46-50	0.6-2.0	0.30-0.40	5.1-5.5	-----------------	0.00		
	50-60	>20	0.02-0.06	5.6-6.0	Low---------------	0.05		
223--------------	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low---------------	0.20	5	<.5
Lonestar	15-17	0.6-2.0	0.13-0.18	5.6-6.5	Low---------------	0.15		
	17-29	0.6-2.0	0.11-0.15	5.6-6.5	Low---------------	0.15		
	29-43	2.0-6.0	0.08-0.12	6.1-7.3	Low---------------	0.15		
	43-60	0.6-2.0	0.11-0.18	5.6-6.5	Low---------------	0.32		
224--------------	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low---------------	0.20	5	<.5
Lonestar	15-17	0.6-2.0	0.13-0.18	5.6-6.5	Low---------------	0.15		
	17-29	0.6-2.0	0.11-0.15	5.6-6.5	Low---------------	0.15		
	29-43	2.0-6.0	0.08-0.12	6.1-7.3	Low---------------	0.15		
	43-60	0.6-2.0	0.11-0.18	5.6-6.5	Low---------------	0.32		
225--------------	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low---------------	0.20	5	<.5
Lonestar	15-22	0.6-2.0	0.13-0.18	5.6-6.5	Low---------------	0.15		
	22-29	0.6-2.0	0.11-0.15	5.6-6.5	Low---------------	0.15		
	29-43	2.0-6.0	0.08-0.12	6.1-7.3	Low---------------	0.15		
	43-60	0.6-2.0	0.11-0.18	5.6-6.5	Low---------------	0.32		

See footnote at end of table.

TABLE 14B.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (POSTERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
226, 227----------	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low--------------	0.17	5	<.5
Minniepeak	15-18	2.0-6.0	0.09-0.13	5.6-6.5	Low--------------	0.15		
	18-23	6.0-20	0.08-0.11	5.6-6.5	Low--------------	0.20		
	23-60	6.0-20	0.04-0.06	5.6-6.5	Low--------------	0.10		
228, 229----------	0-4	6.0-20	0.02-0.05	4.5-6.0	Low--------------	0.10	5	<.5
Minniepeak	4-14	2.0-6.0	0.04-0.08	4.5-6.0	Low--------------	0.15		
	14-17	2.0-6.0	0.09-0.13	5.6-6.5	Low--------------	0.15		
	17-22	2.0-6.0	0.08-0.11	5.6-6.5	Low--------------	0.20		
	22-60	6.0-20	0.04-0.06	5.6-6.5	Low--------------	0.10		
230---------------	0-20	2.0-6.0	0.03-0.05	5.1-6.0	Low--------------	0.05	5	<.5
Obscurity	20-60	2.0-6.0	0.03-0.05	5.1-6.0	Low--------------	0.10		
231---------------	0-10	6.0-20	0.03-0.08	6.6-7.8	Low--------------	0.05	5	<.5
Panhandle	10-60	2.0-6.0	0.06-0.11	6.6-7.8	Low--------------	0.10		
232, 233, 234-----	0-4	6.0-20	0.03-0.06	4.5-6.0	Low--------------	0.05	2	<.5
Pelee	4-14	6.0-20	0.04-0.08	4.5-6.0	Low--------------	0.10		
	14-21	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.20		
	21-46	>20	0.06-0.11	5.6-6.5	Low--------------	0.05		
	46-60	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.20		
235*:								
Pelee------------	0-4	6.0-20	0.03-0.06	4.5-6.0	Low--------------	0.05	2	<.5
	4-14	6.0-20	0.04-0.08	4.5-6.0	Low--------------	0.10		
	14-21	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.20		
	21-46	>20	0.06-0.11	5.6-6.5	Low--------------	0.05		
	46-60	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.20		
Rock outcrop-----	0-60	---	---	---	----------------	---	---	---
236---------------	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low--------------	0.17	5	<.5
Polepatch	15-27	6.0-20	0.03-0.05	5.6-6.5	Low--------------	0.10		
	27-60	6.0-20	0.04-0.08	5.6-6.5	Low--------------	0.02		
237*:								
Rock outcrop-----	0-60	---	---	---	----------------	---	---	---
Cattcreek--------	0-15	2.0-6.0	0.08-0.11	4.5-6.0	Low--------------	0.17	5	<.2
	15-21	6.0-20	0.08-0.12	5.6-6.5	Low--------------	0.10		
	21-30	>20	0.06-0.10	5.6-6.5	Low--------------	0.05		
	30-45	>20	0.07-0.11	5.6-6.5	Low--------------	0.05		
	45-60	0.6-2.0	0.06-0.10	5.6-6.5	Low--------------	0.02		
238, 239----------	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low--------------	0.17	3	<.5
Shoestring	15-25	0.6-2.0	0.13-0.18	5.1-6.0	Low--------------	0.28		
	25-28	0.6-2.0	0.05-0.08	5.6-6.5	Low--------------	0.02		
	28-39	0.6-2.0	0.11-0.15	5.6-6.5	Low--------------	0.20		
	39-60	6.0-20	0.04-0.07	5.6-6.5	Low--------------	0.05		
240, 241, 242, 243, 244, 245---	0-4	6.0-20	0.02-0.05	4.5-6.0	Low--------------	0.05	3	<.5
Sinnice	4-14	2.0-6.0	0.04-0.08	4.5-6.0	Low--------------	0.15		
	14-21	>20	0.06-0.11	5.6-6.5	Low--------------	0.05		
	21-29	2.0-6.0	0.11-0.15	5.6-6.5	Low--------------	0.20		
	29-60	>20	0.06-0.11	5.6-6.5	Low--------------	0.02		

See footnote at end of table.

TABLE 14B.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (POSTERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
246*:								
Sinnice	0-4	6.0-20	0.02-0.05	4.5-6.0	Low	0.05	3	<.5
	4-14	2.0-6.0	0.04-0.08	4.5-6.0	Low	0.15		
	14-21	>20	0.06-0.11	5.6-6.5	Low	0.05		
	21-29	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.20		
	29-60	>20	0.06-0.11	5.6-6.5	Low	0.02		
Rock outcrop	0-60	---	---	---		---	---	---
247*:								
Sinnice	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low	0.17	3	<.5
	15-22	>20	0.06-0.11	5.6-6.5	Low	0.05		
	22-30	2.0-6.0	0.11-0.15	5.6-6.5	Low	0.20		
	30-60	>20	0.06-0.11	5.6-6.5	Low	0.02		
Rock outcrop	0-60	---	---	---		---	---	---
248* Studebaker	0-6	2.0-6.0	0.03-0.05	4.5-6.0	Low	0.05	5	<.5
	6-60	2.0-6.0	0.03-0.05	4.5-6.0	Low	0.05		
249 Swift	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low	0.17	3	<.5
	15-20	0.6-2.0	0.11-0.13	5.6-6.5	Low	0.28		
	20-27	0.6-2.0	0.11-0.13	5.6-6.5	Low	0.17		
	27-42	0.6-2.0	0.06-0.08	5.6-6.5	Low	0.20		
	42-60	0.6-2.0	0.10-0.12	5.6-6.5	Low	0.10		
250*:								
Swift	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low	0.17	3	<.5
	15-20	0.6-2.0	0.11-0.13	5.6-6.5	Low	0.28		
	20-27	0.6-2.0	0.11-0.13	5.6-6.5	Low	0.17		
	27-42	0.6-2.0	0.06-0.08	5.6-6.5	Low	0.20		
	42-60	0.6-2.0	0.10-0.12	5.6-6.5	Low	0.10		
Rock outcrop	0-60	---	---	---		---	---	---
251, 252, 253, 254, 255, 256 Tradedollar	0-15	2.0-6.0	0.06-0.09	4.5-6.0	Low	0.17	5	<.5
	15-20	0.6-2.0	0.11-0.15	5.1-6.0	Low	0.20		
	20-41	2.0-6.0	0.07-0.11	5.1-6.0	Low	0.10		
	41-60	>20	0.06-0.10	5.1-6.0	Low	0.02		
257, 258, 259, 260, 261 Vanson	0-15	2.0-6.0	0.08-0.11	4.5-6.0	Low	0.17	3	<.5
	15-31	2.0-6.0	0.11-0.13	5.1-6.5	Low	0.28		
	31-39	2.0-6.0	0.09-0.13	6.1-7.3	Low	0.17		
	39-60	0.6-2.0	0.07-0.11	5.6-6.0	Low	0.10		
262 Vanson	0-4	2.0-6.0	0.06-0.09	4.5-6.0	Low	0.17	3	<.5
	4-14	6.0-20	0.02-0.05	4.5-6.0	Low	0.05		
	14-30	6.0-20	0.03-0.06	4.5-6.0	Low	0.15		
	30-38	2.0-6.0	0.11-0.13	5.1-6.5	Low	0.28		
	38-60	2.0-6.0	0.09-0.13	6.1-7.3	Low	0.17		
263*:								
Vanson	0-4	2.0-6.0	0.06-0.09	4.5-6.0	Low	0.17	3	<.5
	4-14	6.0-20	0.02-0.05	4.5-6.0	Low	0.05		
	14-30	6.0-20	0.03-0.06	4.5-6.0	Low	0.15		
	30-38	2.0-6.0	0.11-0.13	5.1-6.5	Low	0.28		
	38-60	2.0-6.0	0.09-0.13	6.1-7.3	Low	0.17		
Rock outcrop	0-60	---	---	---		---	---	---

See footnote at end of table.

TABLE 14B.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS (POSTERUPTION)--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
264*:								
Vanson----------	0-15	2.0-6.0	0.08-0.11	4.5-6.0	Low--------------	0.17	3	<.5
	15-31	2.0-6.0	0.11-0.13	5.1-6.5	Low--------------	0.28		
	31-39	2.0-6.0	0.09-0.13	6.1-7.3	Low--------------	0.17		
	39-60	0.6-2.0	0.07-0.11	5.6-6.0	Low--------------	0.10		
Rock outcrop----	0-60	---	---	---	----------------	---	---	---
265*:								
Vanson----------	0-4	2.0-6.0	0.06-0.09	4.5-6.0	Low--------------	0.17	3	<.5
	4-14	6.0-20	0.02-0.05	4.5-6.0	Low--------------	0.05		
	14-30	6.0-20	0.03-0.06	4.5-6.0	Low--------------	0.15		
	30-38	2.0-6.0	0.11-0.13	5.1-6.5	Low--------------	0.28		
	38-60	2.0-6.0	0.09-0.13	6.1-7.3	Low--------------	0.17		
Rock outcrop----	0-60	---	---	---	----------------	---	---	---
266-------------- Wakepish	0-30	2.0-6.0	0.05-0.08	4.5-6.0	Low--------------	0.10	5	<.5
	30-60	2.0-6.0	0.03-0.05	4.5-6.0	Low--------------	0.05		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15A.--WATER FEATURES (PREERUPTION)

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
1 Andic Cryumbrepts	B	None	---	---	>6.0	---	---
2 Arents	B	None	---	---	>6.0	---	---
, 4 Aschoff	B	None	---	---	>6.0	---	---
*:							
Aschoff	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
* adland	D	None	---	---	>6.0	---	---
, 8, 9, 10, 11 Bandid	B	None	---	---	>6.0	---	---
, 13, 14 Bannel	B	None	---	---	>6.0	---	---
5, 16 Benham	B	None	---	---	>6.0	---	---
7 Bonneville	A	Rare	---	---	>6.0	---	---
8, 19, 20 attcreek	B	None	---	---	>6.0	---	---
1, 22, 23, 24 hemawa	B	None	---	---	>6.0	---	---
, 26, 27 innamon	B	None	---	---	>6.0	---	---
, 29, 30, 31, 32, 33 olter	B	None	---	---	>6.0	---	---
*:							
olter	B	None	---	---	>6.0	---	---
ock outcrop	D	None	---	---	>6.0	---	---
 ryandepts	C	None	---	---	>6.0	---	---
, 37 ougan	C	None	---	---	>6.0	---	---
, 39, 40 orsyth	A	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 15A.--WATER FEATURES (PREERUPTION)--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
41 Fortran	B	None	---	---	>6.0	---	---
42 Haplumbrepts	C	None	---	---	1.0-3.0	Apparent	Jan-May
43, 44, 45, 46 Hatchet	C	None	---	---	>6.0	---	---
47*, 48*, 49*:							
Hatchet	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
50, 51, 52 Hesson	C	None	---	---	>6.0	---	---
53 Histic Cryaquepts	D	None	---	---	0-2.0	Apparent	Nov-Jul
54, 55 Hoffstadt	B	None	---	---	>6.0	---	---
56 Hood	B	None	---	---	>6.0	---	---
57, 58, 59 Kinney	B	None	---	---	>6.0	---	---
60 Lithic Umbric Vitrandepts	D	None	---	---	>6.0	---	---
61, 62, 63 Lonestar	B	None	---	---	>6.0	---	---
64 McBee	C	Rare	---	---	3.0-4.0	Apparent	Mar-May
65 McDoug	B	Rare	---	---	2.5-3.5	Apparent	Mar-May
66, 67, 68, 69 McElroy	B	None	---	---	>6.0	---	---
70, 71, 72 Minniepeak	A	None	---	---	>6.0	---	---
73, 74 Mossyrock	B	None	---	---	>6.0	---	---
75, 76, 77 Mountzion	B	None	---	---	>6.0	---	---
78, 79, 80 Pelee	B	None	---	---	>6.0	---	---
81*:							
Pelee	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 15A.--WATER FEATURES (PREERUPTION)--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
82 Pilchuck	C	Occasional	Brief	Nov-Apr	2.0-4.0	Apparent	Nov-Apr
83 Pillery	B	Occasional	Brief	Mar-May	3.0-4.0	Apparent	Mar-May
84, 85 Pinchot	B	None	---	---	>6.0	---	---
86 Pinoty	B	None	---	---	>6.0	---	---
87* Pits	A	None	---	---	>6.0	---	---
88, 89 Polepatch	A	None	---	---	>6.0	---	---
90* Riverwash	D	Frequent	Long to very long.	Oct-Jul	0-2.0	Apparent	Jan-Dec
91*:							
Rock outcrop	D	None	---	---	>6.0	---	---
Cattcreek	B	None	---	---	>6.0	---	---
92*:							
Rock outcrop	D	None	---	---	>6.0	---	---
Rubble land	A	None	---	---	>6.0	---	---
93*:							
Rock outcrop	D	None	---	---	>6.0	---	---
Xerorthents	D	None	---	---	>6.0	---	---
94, 95 Shoestring	B	None	---	---	>6.0	---	---
96, 97, 98, 99, 100, 101 Sinnice	B	None	---	---	>6.0	---	---
102*:							
Sinnice	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
103, 104, 105, 106 Skamania	B	None	---	---	>6.0	---	---
107, 108 Skelida	B	None	---	---	>6.0	---	---
109, 110, 111 Skoly	B	None	---	---	>6.0	---	---
112*, 113*:							
Skoly	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 15A.--WATER FEATURES (PREERUPTION)--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
114---------------------- St. Helens	B	None------------	---	---	>6.0	---	---
115, 116, 117, 118------ St. Martin	D	None------------	---	---	1.0-2.0	Perched	Dec-Apr
119---------------------- Stabbart	D	None------------	---	---	0.5-1.0	Apparent	Jan-May
120, 121, 122----------- Stabler	B	None------------	---	---	>6.0	---	---
123, 124---------------- Steever	B	None------------	---	---	>6.0	---	---
125*, 126*:							
Steever-----------------	B	None------------	---	---	>6.0	---	---
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
127, 128, 129----------- Stevenson	B	None------------	---	---	>6.0	---	---
130, 131, 132----------- Swift	B	None------------	---	---	>6.0	---	---
133*, 134*:							
Swift-------------------	B	None------------	---	---	>6.0	---	---
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
135, 136---------------- Timberhead	B	None------------	---	---	>6.0	---	---
137, 138, 139, 140, 141, 142-------------------- Tradedollar	B	None------------	---	---	>6.0	---	---
143--------------------- Typic Dystrandepts	B	None------------	---	---	>6.0	---	---
144, 145, 146----------- Underwood	B	None------------	---	---	>6.0	---	---
147, 148---------------- Undusk	B	None------------	---	---	>6.0	---	---
149, 150, 151, 152, 153- Vanson	B	None------------	---	---	>6.0	---	---
154*, 155*, 156*:							
Vanson------------------	B	None------------	---	---	>6.0	---	---
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
157--------------------- Washougal	B	Rare------------	---	---	>6.0	---	---
158, 159, 160----------- Washougal	B	None------------	---	---	>6.0	---	---

See footnote at end of table.

TABLE 15A.--WATER FEATURES (PREERUPTION)--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
161*:							
Xerorthents	D	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
162, 163, 164 Yalelake	B	None	---	---	>6.0	---	---
165, 166 Zygore	B	None	---	---	>6.0	---	---
167*:							
Zygore	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
168, 169, 170 Zymer	B	None	---	---	>6.0	---	---
171*, 172*:							
Zymer	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
173 Zynbar	C	None	---	---	3.0-4.0	Perched	Dec-Mar

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15B.--WATER FEATURES (POSTERUPTION)

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
200, 201, 202 Bandid	B	None	---	---	>6.0	---	---
203, 204 Cattcreek	B	None	---	---	>6.0	---	---
205 Cinnamon	B	None	---	---	>6.0	---	---
206, 207, 208, 209, 210, 211, 212 Colter	B	None	---	---	>6.0	---	---
213*:							
Colter	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
214 Cryandepts	C	None	---	---	>6.0	---	---
215 Elkprairie	B	None	---	---	>6.0	---	---
216, 217, 218 Hatchet	B	None	---	---	>6.0	---	---
219*:							
Hatchet	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
220*:							
Hatchet	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
221*:							
Hatchet	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
222 Histic Cryaquepts	D	None	---	---	0.5-2.5	Apparent	Nov-Jul
223, 224, 225 Lonestar	B	None	---	---	>6.0	---	---
226, 227, 228, 229 Minniepeak	B	None	---	---	>6.0	---	---
230 Obscurity	B	Rare	---	---	>6.0	---	---
231 Panhandle	B	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 15B.--WATER FEATURES (POSTERUPTION)--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
232, 233, 234----------- Pelee	B	None------------	---	---	>6.0	---	---
235*:							
Pelee------------------	B	None------------	---	---	>6.0	---	---
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
236-------------------- Polepatch	A	None------------	---	---	>6.0	---	---
237*:							
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
Cattcreek--------------	B	None------------	---	---	>6.0	---	---
238, 239--------------- Shoestring	B	None------------	---	---	>6.0	---	---
240, 241, 242, 243, 244, 245-------------------- Sinnice	B	None------------	---	---	>6.0	---	---
246*, 247*:							
Sinnice----------------	B	None------------	---	---	>6.0	---	---
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
248*------------------- Studebaker	B	None------------	---	---	>6.0	---	---
249-------------------- Swift	B	None------------	---	---	>6.0	---	---
250*:							
Swift------------------	B	None------------	---	---	>6.0	---	---
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
251, 252, 253, 254, 255, 256------------------ Tradedollar	B	None------------	---	---	>6.0	---	---
257, 258, 259, 260, 261, 262------------------- Vanson	B	None------------	---	---	>6.0	---	---
263*, 264*, 265*:							
Vanson-----------------	B	None------------	---	---	>6.0	---	---
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
266-------------------- Wakepish	B	Frequent--------	Brief---------	May-Jun	>6.0	---	---

---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16A.--SOIL FEATURES (PREERUPTION)

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
1 Andic Cryumbrepts	40-80	Hard	Moderate	Moderate	Moderate.
2 Arents	>60	---	Moderate	Moderate	Moderate.
3, 4 Aschoff	>60	---	Moderate	Moderate	Moderate.
5*:					
Aschoff	>60	---	Moderate	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
6* Badland	0-3	Soft	---	---	---
7, 8, 9, 10, 11 Bandid	>60	---	Moderate	Moderate	Moderate.
12, 13, 14 Bannel	>60	---	High	Moderate	Moderate.
15, 16 Benham	>60	---	High	Moderate	Moderate.
17 Bonneville	>60	---	Low	Moderate	Moderate.
18, 19, 20 Cattcreek	40-60	Hard	Moderate	Moderate	Moderate.
21, 22, 23, 24 Chemawa	>60	---	High	Moderate	Moderate.
25, 26, 27 Cinnamon	>60	---	High	Moderate	Moderate.
28, 29, 30, 31, 32, 33 Colter	>60	---	High	Moderate	Moderate.
34*:					
Colter	>60	---	High	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
35 Cryandepts	>50	Hard	High	Moderate	Moderate.
36, 37 Dougan	30-40	Hard	Moderate	High	High.
38, 39, 40 Forsyth	>60	---	Low	Moderate	Moderate.
41 Fortran	>60	---	Low	Moderate	Moderate.

See footnote at end of table.

TABLE 16A.--SOIL FEATURES (PREERUPTION)--Continued

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
42 Haplumbrepts	>60	---	High	Moderate	Moderate.
43, 44, 45, 46 Hatchet	20-40	Hard	High	Moderate	Moderate.
47*, 48*, 49*:					
Hatchet	20-40	Hard	High	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
50, 51, 52 Hesson	>60	---	Moderate	High	High.
53 Histic Cryaquepts	>60	---	High	High	High.
54, 55 Hoffstadt	40-60	Hard	High	Moderate	Moderate.
56 Hood	>60	---	Moderate	Moderate	Moderate.
57, 58, 59 Kinney	>60	---	Moderate	High	High.
60 Lithic Umbric Vitrandepts	5-15	Hard	Low	Moderate	Moderate.
61, 62, 63 Lonestar	>60	---	High	Moderate	Moderate.
64 McBee	>60	---	High	Moderate	Moderate.
65 McDoug	>60	---	High	Moderate	Moderate.
66, 67, 68, 69 McElroy	>60	---	Moderate	Moderate	Moderate.
70, 71, 72 Minniepeak	>60	---	Moderate	Moderate	Moderate.
73, 74 Mossyrock	>60	---	Moderate	Moderate	Moderate.
75, 76, 77 Mountzion	>60	---	Moderate	High	High.
78, 79, 80 Pelee	>60	---	Moderate	Moderate	Moderate.
81*:					
Pelee	>60	---	Moderate	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
82 Pilchuck	>60	---	Low	Moderate	Moderate.

See footnote at end of table.

TABLE 16A.--SOIL FEATURES (PREERUPTION)--Continued

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
83 Pillery	>60	---	Low	Moderate	Moderate.
84, 85 Pinchot	>60	---	High	Moderate	Moderate.
86 Pinoty	>60	---	High	Moderate	Low.
87* Pits	>60	---	---	---	---
88, 89 Polepatch	>60	---	Low	Moderate	Moderate.
90* Riverwash	>60	---	---	---	---
91*:					
Rock outcrop	0	Hard	---	---	---
Cattcreek	40-60	Hard	Moderate	Moderate	Moderate.
92*:					
Rock outcrop	0	Hard	---	---	---
Rubble land	>40	Hard	---	---	---
93*:					
Rock outcrop	0	Hard	---	---	---
Xerorthents	10-60	Hard	Moderate	Moderate	Low.
94, 95 Shoestring	>60	---	High	Moderate	Moderate.
96, 97, 98, 99, 100, 101 Sinnice	>60	---	Moderate	Moderate	Moderate.
102*:					
Sinnice	>60	---	Moderate	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
103, 104, 105, 106 Skamania	>60	---	High	Moderate	Moderate.
107, 108 Skelida	>60	---	High	Moderate	Moderate.
109, 110, 111 Skoly	>60	---	Moderate	Moderate	Moderate.
112*, 113*:					
Skoly	>60	---	Moderate	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
114 St. Helens	>60	---	High	Moderate	Moderate.

See footnote at end of table.

TABLE 16A.--SOIL FEATURES (PREERUPTION)--Continued

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
115, 116, 117, 118 St. Martin	>60	---	High	Moderate	Moderate.
119 Stabbart	>60	---	High	Moderate	Moderate.
120, 121, 122 Stabler	>60	---	High	Moderate	Moderate.
123, 124 Steever	>60	---	Moderate	Moderate	Moderate.
125*, 126*:					
Steever	>60	---	Moderate	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
127, 128, 129 Stevenson	>60	---	Moderate	Moderate	Moderate.
130, 131, 132 Swift	>60	---	Moderate	Moderate	Moderate.
133*, 134*:					
Swift	>60	---	Moderate	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
135, 136 Timberhead	>60	---	High	Moderate	Moderate.
137, 138, 139, 140, 141, 142 Tradedollar	>60	---	High	Moderate	Moderate.
143 Typic Dystrandepts	>60	---	High	Moderate	Moderate.
144, 145, 146 Underwood	>60	---	Moderate	Moderate	Moderate.
147, 148 Undusk	>60	---	Moderate	Moderate	Low.
149, 150, 151, 152, 153 Vanson	40-60	Hard	High	Moderate	Moderate.
154*, 155*, 156*:					
Vanson	40-60	Hard	High	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
157 Washougal	>60	---	Moderate	High	High.
158, 159, 160 Washougal	>60	---	Moderate	High	High.
161*:					
Xerorthents	10-60	Hard	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 16A.--SOIL FEATURES (PREERUPTION)--Continued

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
161*:					
Rock outcrop	0	Hard	---	---	---
162, 163, 164 Yalelake	>60	---	High	Moderate	Low.
165, 166 Zygore	>60	---	Moderate	High	High.
167*:					
Zygore	>60	---	Moderate	High	High.
Rock outcrop	0	Hard	---	---	---
168, 169, 170 Zymer	>60	---	Moderate	Moderate	Moderate.
171*, 172*:					
Zymer	>60	---	Moderate	Moderate	Moderate.
Rock outcrop	0	Hard	---	---	---
173 Zynbar	>60	---	High	Moderate	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16B.--SOIL FEATURES (POSTERUPTION)

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
200, 201, 202 Bandid	>60	---	Moderate	High	High.
203, 204 Cattcreek	>60	---	Moderate	High	High.
205 Cinnamon	>60	---	Moderate	High	High.
206, 207, 208, 209, 210, 211, 212 Colter	>60	---	Moderate	High	High.
213*:					
Colter	>60	---	Moderate	High	High.
Rock outcrop	0	Hard	---	---	---
214 Cryandepts	>60	---	Moderate	High	High.
215 Elkprairie	>60	---	High	High	High.
216, 217, 218 Hatchet	20-40	Hard	High	High	High.
219*:					
Hatchet	20-40	Hard	Moderate	High	High.
Rock outcrop	0	Hard	---	---	---
220*:					
Hatchet	20-40	Hard	High	High	High.
Rock outcrop	0	Hard	---	---	---
221*:					
Hatchet	20-40	Hard	Moderate	High	High.
Rock outcrop	0	Hard	---	---	---
222 Histic Cryaquepts	>60	---	High	High	High.
223, 224, 225 Lonestar	>60	---	High	High	High.
226, 227, 228, 229 Minniepeak	>60	---	Moderate	High	High.
230 Obscurity	>60	---	Low	Moderate	Moderate.
231 Panhandle	>60	---	Low	Moderate	Low.

See footnote at end of table.

TABLE 16B.--SOIL FEATURES (POSTERUPTION)--Continued

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
232, 233, 234 Pelee	>60	---	Moderate	High	High.
235*:					
Pelee	>60	---	Moderate	High	High.
Rock outcrop	0	Hard	---	---	---
236 Polepatch	>60	---	Low	High	High.
237*:					
Rock outcrop	0	Hard	---	---	---
Cattcreek	>60	---	Moderate	High	High.
238, 239 Shoestring	>60	---	High	High	High.
240, 241, 242, 243, 244, 245 Sinnice	>60	---	Moderate	High	High.
246*, 247*:					
Sinnice	>60	---	Moderate	High	High.
Rock outcrop	0	Hard	---	---	---
248* Studebaker	>60	---	Low	High	High.
249 Swift	>60	---	Moderate	High	High.
250*:					
Swift	>60	---	Moderate	High	High.
Rock outcrop	0	Hard	---	---	---
251, 252, 253, 254, 255, 256 Tradedollar	>60	---	Moderate	High	High.
257, 258, 259, 260, 261, 262 Vanson	>60	---	High	High	High.
263*, 264*, 265*:					
Vanson	>60	---	High	High	High.
Rock outcrop	0	Hard	---	---	---
266 Wakepish	>60	---	Low	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Andic Cryumbrepts	Andic Cryumbrepts
Arents	Arents
Aschoff	Medial-skeletal, mesic Andic Haplumbrepts
Bandid	Ashy over cindery, frigid Typic Vitrandepts
Bannel	Ashy, frigid Typic Vitrandepts
Benham	Cindery over medial, frigid Typic Vitrandepts
Bonneville	Sandy-skeletal, mixed, mesic Entic Xerumbrepts
Cattcreek	Cindery over medial-skeletal Typic Cryorthods
Chemawa	Medial, mesic Andic Xerumbrepts
Cinnamon	Ashy over medial, frigid Typic Vitrandepts
Colter	Cindery over medial Entic Cryandepts
Cryandepts	Cryandepts
Dougan	Medial-skeletal, frigid Andic Haplumbrepts
Elkprairie	Ashy over medial Typic Cryorthents
Forsyth	Sandy-skeletal, mixed, frigid Andeptic Udorthents
Fortran	Ashy over sandy or sandy-skeletal, mixed, mesic Typic Vitrandepts
Haplumbrepts	Haplumbrepts
Hatchet	Medial-skeletal Typic Cryorthods
Hesson	Clayey, kaolinitic, mesic Xeric Palehumults
Histic Cryaquepts	Histic Cryaquepts
Hoffstadt	Medial-skeletal, frigid Andic Dystrochrepts
Hood	Fine-loamy, mixed, mesic Ultic Haploxeralfs
*Kinney	Fine-loamy, mixed, mesic Andic Haplumbrepts
Lithic Umbric Vitrandepts	Lithic Umbric Vitrandepts
Lonestar	Ashy over medial Humic Cryorthods
McBee	Fine-silty, mixed, mesic Cumulic Ultic Haploxerolls
McDoug	Fine-loamy, mixed, mesic Cumulic Ultic Haploxerolls
McElroy	Medial-skeletal, mesic Andic Xerumbrepts
Minniepeak	Cindery Entic Cryandepts
Mossyrock	Medial, mesic Typic Dystrandepts
Mountzion	Fine-loamy, mixed, mesic Typic Palehumults
Obscurity	Sandy-skeletal, mixed Typic Cryorthents
Panhandle	Cindery Typic Cryorthents
Pelee	Cindery Entic Cryandepts
Pilchuck	Mixed, mesic Dystric Xeropsamments
Pillery	Coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents
Pinchot	Ashy over sandy or sandy-skeletal, mixed, mesic Typic Vitrandepts
Pinoty	Ashy over medial, mesic Typic Vitrandepts
Polepatch	Sandy-skeletal, mixed Typic Cryorthents
Shoestring	Medial over sandy or sandy-skeletal, mixed Typic Cryorthods
Sinnice	Ashy over cindery Entic Cryandepts
Skamania	Coarse-loamy, mixed, mesic Typic Xerumbrepts
Skelida	Fine-silty, mixed, mesic Typic Xerumbrepts
Skoly	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
St. Helens	Ashy over sandy or sandy-skeletal, mixed, frigid Typic Vitrandepts
St. Martin	Fine, montmorillonitic, mesic Aquic Hapludolls
Stabbart	Fine-loamy, mixed, mesic Aquic Hapludolls
Stabler	Medial, mesic Entic Dystrandepts
Steever	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Stevenson	Fine-loamy, mixed, mesic Typic Haplumbrepts
Swift	Ashy over loamy-skeletal, mixed, frigid Typic Vitrandepts
Timberhead	Medial, frigid Andic Xerumbrepts
Tradedollar	Cindery Typic Cryorthods
Typic Dystrandepts	Typic Dystrandepts
Underwood	Fine-loamy, mixed, mesic Ultic Haploxeralfs
Undusk	Loamy-skeletal, mixed, frigid Typic Xerumbrepts
Vanson	Ashy over loamy-skeletal, mixed Typic Cryorthods
Washougal	Medial-skeletal, mesic Andic Xerumbrepts
Xerorthents	Xerorthents
Yalelake	Ashy over medial, mesic Umbric Vitrandepts

TABLE 17.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Zygore	Medial-skeletal, frigid Andic Haplumbrepts
Zymer	Ashy over loamy-skeletal, mixed, mesic Umbric Vitrandepts
Zynbar	Medial, frigid Entic Dystrandepts

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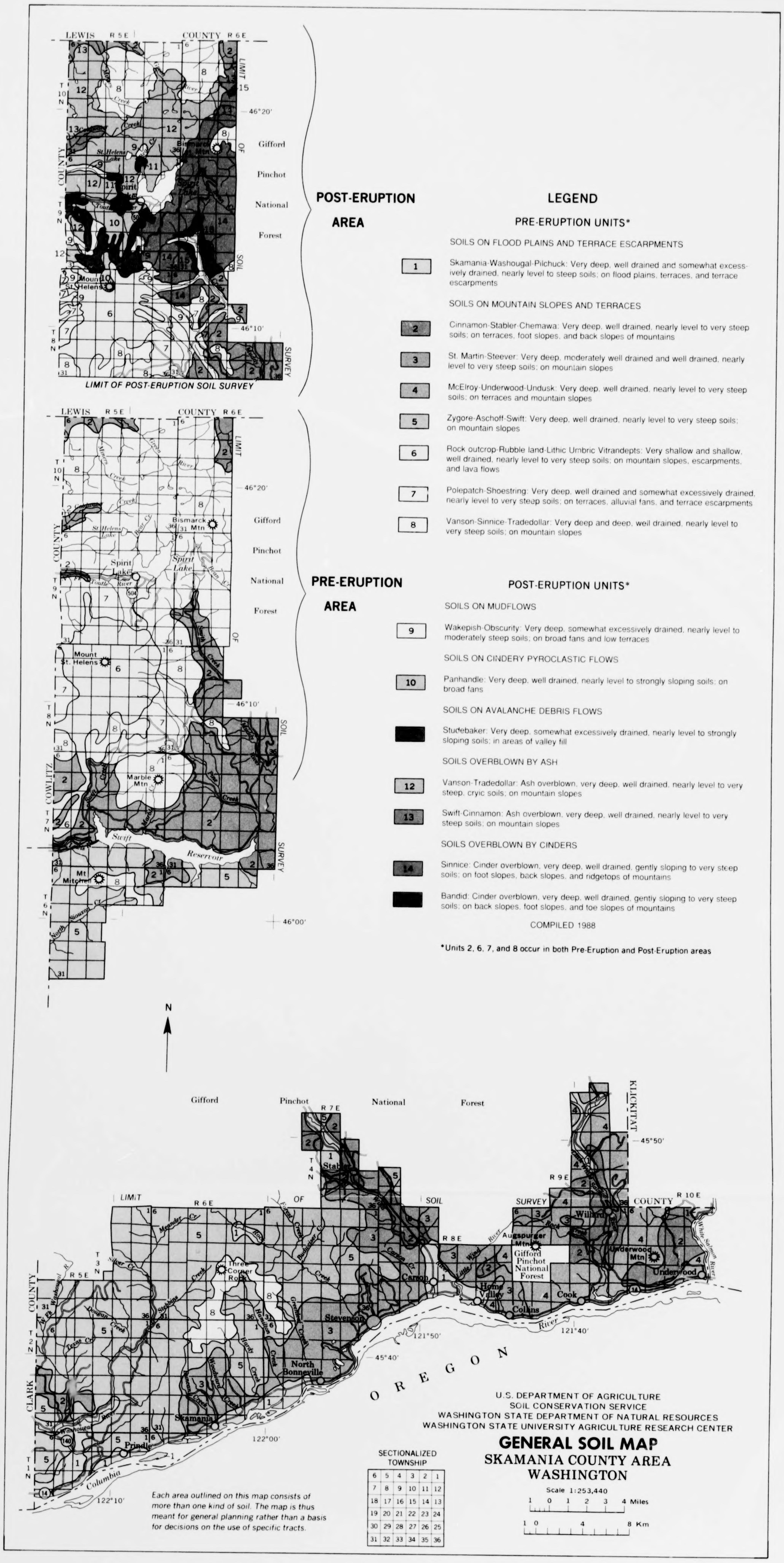
MAPS

TRANSPOSED TO

END OF VOLUME


POST-ERUPTION AREA
PRE-ERUPTION AREA
LEWIS COUNTY
COWLITZ COUNTY
CLARK COUNTY
KLICKITAT COUNTY
R 5 E
R 6 E
R 7 E
R 8 E
R 9 E
R 10 E
T 10 N
T 9 N
T 8 N
T 7 N
T 6 N
T 4 N
T 3 N
T 2 N
T 1 N
LIMIT OF SOIL SURVEY
LIMIT OF POST-ERUPTION SOIL SURVEY
Gifford Pinchot National Forest
46°20'
46°10'
46°00'
45°50'
45°40'
121°40'
121°50'
122°00'
122°10'
St. Helens Lake
Spirit Lake
Toutle River
Mount St. Helens
Bismarck Mtn
Marble Mtn
Mt Mitchell
Swift Reservoir
Three Corner Rock
Augspurger Mtn
Underwood Mtn
Stabler
Carson
Home Valley
Cook
Collins
Willard
Underwood
Stevenson
North Bonneville
Skamania
Prindle
Columbia River
White Salmon River
Wind River
OREGON
N

LEGEND

PRE-ERUPTION UNITS*

SOILS ON FLOOD PLAINS AND TERRACE ESCARPMENTS

1 Skamania-Washougal-Pilchuck: Very deep, well drained and somewhat excessively drained, nearly level to steep soils; on flood plains, terraces, and terrace escarpments

SOILS ON MOUNTAIN SLOPES AND TERRACES

2 Cinnamon-Stabler-Chemawa: Very deep, well drained, nearly level to very steep soils; on terraces, foot slopes, and back slopes of mountains

3 St. Martin-Steever: Very deep, moderately well drained and well drained, nearly level to very steep soils; on mountain slopes

4 McElroy-Underwood-Undusk: Very deep, well drained, nearly level to very steep soils; on terraces and mountain slopes

5 Zygore-Aschoff-Swift: Very deep, well drained, nearly level to very steep soils; on mountain slopes

6 Rock outcrop-Rubble land-Lithic Umbric Vitrandepts: Very shallow and shallow, well drained, nearly level to very steep soils; on mountain slopes, escarpments, and lava flows

7 Polepatch-Shoestring: Very deep, well drained and somewhat excessively drained, nearly level to very steep soils; on terraces, alluvial fans, and terrace escarpments

8 Vanson-Sinnice-Tradedollar: Very deep and deep, well drained, nearly level to very steep soils; on mountain slopes

POST-ERUPTION UNITS*

SOILS ON MUDFLOWS

9 Wakepish-Obscurity: Very deep, somewhat excessively drained, nearly level to moderately steep soils; on broad fans and low terraces

SOILS ON CINDERY PYROCLASTIC FLOWS

10 Panhandle: Very deep, well drained, nearly level to strongly sloping soils; on broad fans

SOILS ON AVALANCHE DEBRIS FLOWS

■ Studebaker: Very deep, somewhat excessively drained, nearly level to strongly sloping soils; in areas of valley fill

SOILS OVERBLOWN BY ASH

12 Vanson-Tradedollar: Ash overblown, very deep, well drained, nearly level to very steep, cryic soils; on mountain slopes

13 Swift-Cinnamon: Ash overblown, very deep, well drained, nearly level to very steep soils; on mountain slopes

SOILS OVERBLOWN BY CINDERS

14 Sinnice: Cinder overblown, very deep, well drained, gently sloping to very steep soils; on foot slopes, back slopes, and ridgetops of mountains

■ Bandid: Cinder overblown, very deep, well drained, gently sloping to very steep soils; on back slopes, foot slopes, and toe slopes of mountains

COMPILED 1988

*Units 2, 6, 7, and 8 occur in both Pre-Eruption and Post-Eruption areas

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SECTIONALIZED TOWNSHIP

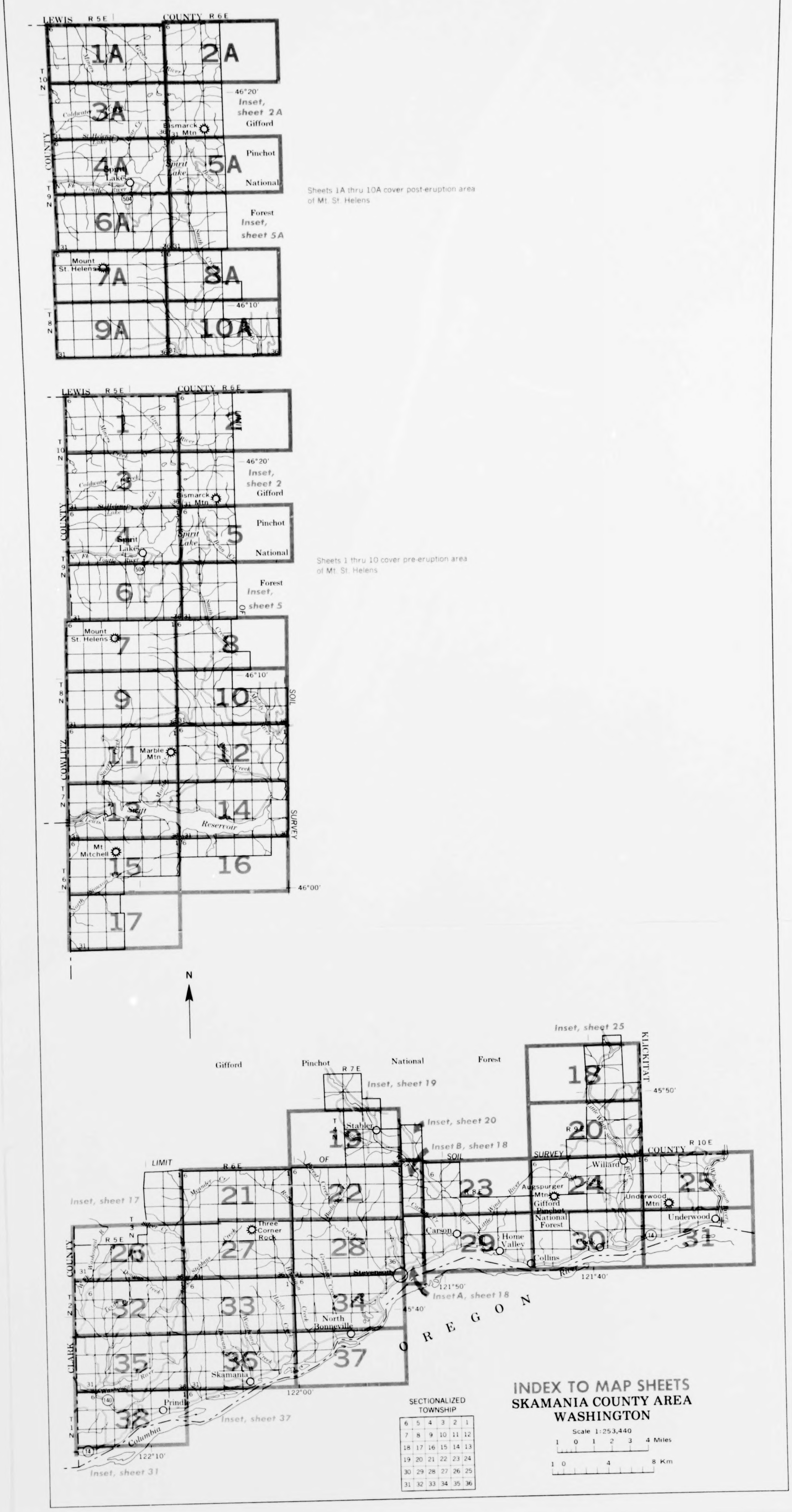
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES
WASHINGTON STATE UNIVERSITY AGRICULTURE RESEARCH CENTER

GENERAL SOIL MAP
SKAMANIA COUNTY AREA
WASHINGTON

Scale 1:253,440
1 0 1 2 3 4 Miles
1 0 4 8 Km

best copy available


1A
2A
3A
4A
5A
6A
7A
8A
9A
10A
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8
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34
35
36
37
38
LEWIS
COUNTY
COWLITZ
CLARK
KLICKITAT
R 5 E
R 6 E
R 7 E
R 8 E
R 10 E
T 10 N
T 9 N
T 8 N
T 7 N
T 6 N
T 3 N
T 2 N
T 1 N
46°20'
46°10'
46°00'
45°50'
45°40'
121°40'
121°50'
122°00'
122°10'
Inset, sheet 2A
Inset, sheet 5A
Inset, sheet 2
Inset, sheet 5
Inset, sheet 17
Inset, sheet 19
Inset, sheet 20
Inset, sheet 25
Inset, sheet 37
Inset, sheet 31
Inset B, sheet 18
Inset A, sheet 18
Gifford Pinchot National Forest
SOIL SURVEY
LIMIT OF SOIL SURVEY
Bismarck Mtn
Spirit Lake
Mount St. Helens
Marble Mtn
Mt Mitchell
Swift Reservoir
Stabler
Carson
Home Valley
Collins
Augspurger Mtn
Willard
Underwood Mtn
Underwood
Three Corner Rock
Stevenson
North Bonneville
Skamania
Prindle
Columbia River
OREGON
N

Sheets 1A thru 10A cover post-eruption area of Mt. St. Helens

Sheets 1 thru 10 cover pre-eruption area of Mt. St. Helens

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS
SKAMANIA COUNTY AREA
WASHINGTON

Scale 1:253,440

1 0 1 2 3 4 Miles

1 0 4 8 Km

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SKAMANIA COUNTY AREA, WASHINGTON

WASHINGTON STATE DEPARTMENT OF NATURAL RESO
WASHINGTON STATE UNIVERSITY AGRICULTURE RESEARCH C

SOIL LEGEND

PRE-ERUPTION MAP UNITS

SYMBOL	NAME
1	Andic Cryumbrepts, 5 to 65 percent slopes
2	Arents, 0 to 5 percent slopes
3	Aschoff very gravelly loam, 5 to 30 percent slopes
4	Aschoff very gravelly loam, 30 to 65 percent slopes
5	Aschoff-Rock outcrop complex, 30 to 65 percent slopes
6	Badland
7	Bandid loamy sand, 30 to 65 percent slopes
8	Bandid loamy sand, 65 to 90 percent slopes
9	Bandid cindery sandy loam, 5 to 30 percent slopes
10	Bandid cindery sandy loam, 30 to 65 percent slopes
11	Bandid cindery sandy loam, 65 to 90 percent slopes
12	Bannel cindery sandy loam, 5 to 30 percent slopes
13	Bannel cindery sandy loam, 30 to 65 percent slopes
14	Bannel cindery sandy loam, 65 to 90 percent slopes
15	Benham very cindery sandy loam, 0 to 30 percent slopes
16	Benham very cindery sandy loam, 30 to 65 percent slopes
17	Bonneville stony sandy loam
18	Cattcreek very cindery loamy sand, 65 to 90 percent slopes
19	Cattcreek very cindery loamy sand, cold, 30 to 65 percent slopes
20	Cattcreek very cindery loamy sand, cold, 65 to 90 percent slopes
21	Chemawa loam, 2 to 8 percent slopes
22	Chemawa loam, 8 to 15 percent slopes
23	Chemawa loam, 15 to 30 percent slopes
24	Chemawa loam, 30 to 50 percent slopes
25	Cinnamon sandy loam, 2 to 30 percent slopes
26	Cinnamon sandy loam, 30 to 65 percent slopes
27	Cinnamon sandy loam, 65 to 90 percent slopes
28	Colter cindery sandy loam, 0 to 30 percent slopes
29	Colter cindery sandy loam, 30 to 65 percent slopes
30	Colter cindery sandy loam, 65 to 90 percent slopes
31	Colter cindery sandy loam, cold, 0 to 30 percent slopes
32	Colter cindery sandy loam, cold, 30 to 65 percent slopes
33	Colter cindery sandy loam, cold, 65 to 90 percent slopes
34	Colter, cold-Rock outcrop complex, 30 to 65 percent slopes
35	Cryandepts, 45 to 120 percent slopes
36	Dougan very gravelly loam, 5 to 30 percent slopes
37	Dougan very gravelly loam, 30 to 65 percent slopes
38	Forsyth cindery loamy sand, 65 to 120 percent slopes
39	Forsyth cobbly loamy sand, 0 to 30 percent slopes
40	Forsyth stony loamy sand, 0 to 30 percent slopes
41	Fortran cindery loamy sand, 65 to 120 percent slopes
42	Haplumbrepts, 0 to 3 percent slopes
43	Hatchet gravelly sandy loam, 30 to 65 percent slopes
44	Hatchet gravelly sandy loam, 65 to 90 percent slopes
45	Hatchet gravelly sandy loam, cold, 30 to 65 percent slopes
46	Hatchet gravelly sandy loam, cold, 65 to 90 percent slopes
47	Hatchet-Rock outcrop complex, 65 to 90 percent slopes
48	Hatchet, cold-Rock outcrop complex, 30 to 65 percent slopes
49	Hatchet, cold-Rock outcrop complex, 65 to 90 percent slopes
50	Hesson clay loam, 5 to 15 percent slopes
51	Hesson clay loam, 15 to 30 percent slopes
52	Hesson clay loam, 30 to 40 percent slopes
53	Histic Cryaquepts, 0 to 5 percent slopes
54	Hoffstadt very gravelly sandy loam, 2 to 30 percent slopes
55	Hoffstadt very gravelly sandy loam, 30 to 65 percent slopes
56	Hood loam, 15 to 30 percent slopes
57	Kinney loam, 5 to 30 percent slopes
58	Kinney loam, 30 to 65 percent slopes
59	Kinney loam, 30 to 65 percent east slopes
60	Lithic Umbric Vitrandepts, 0 to 15 percent slopes
61	Lonestar cindery sandy loam, 5 to 30 percent slopes
62	Lonestar cindery sandy loam, 30 to 65 percent slopes
63	Lonestar cindery sandy loam, 65 to 90 percent slopes
64	McBee silt loam
65	McDoug silt loam
66	McElroy gravelly loam, 5 to 15 percent slopes
67	McElroy gravelly loam, 15 to 30 percent slopes
68	McElroy gravelly loam, 30 to 65 percent slopes
69	McElroy very stony loam, 5 to 15 percent slopes
70	Minniepeak cindery sandy loam, 5 to 30 percent slopes
71	Minniepeak cindery sandy loam, 30 to 65 percent slopes
72	Minniepeak cindery sandy loam, 65 to 90 percent slopes
73	Mossyrock silt loam, 2 to 5 percent slopes
74	Mossyrock silt loam, 5 to 15 percent slopes

SYMBOL	NAME
75	Olyic clay loam, 2 to 15 percent slopes
76	Olyic clay loam, 15 to 30 percent slopes
77	Olyic clay loam, 30 to 65 percent slopes
78	Pelee sandy loam, 5 to 30 percent slopes
79	Pelee sandy loam, 30 to 65 percent slopes
80	Pelee sandy loam, 65 to 90 percent slopes
81	Pelee-Rock outcrop complex, 65 to 90 percent slopes
82	Pilchuck very fine sandy loam
83	Pillery fine sandy loam
84	Pinchot cindery sandy loam, 0 to 30 percent slopes
85	Pinchot cindery sandy loam, 50 to 90 percent slopes
86	Pinoty sandy loam, 0 to 30 percent slopes
87	Pits
88	Polepatch extremely bouldery loamy sand, 0 to 30 percent slopes
89	Polepatch extremely bouldery loamy sand, cold, 0 to 30 percent slopes
90	Riverwash
91	Rock outcrop-Cattcreek complex, cold, 65 to 90 percent slopes
92	Rock outcrop-Rubble land complex
93	Rock outcrop-Xerorthents complex, 50 to 90 percent slopes
94	Shoestring fine sandy loam, 0 to 30 percent slopes
95	Shoestring fine sandy loam,50 to 90 percent slopes
96	Sinnice extremely cindery loamy sand, 5 to 30 percent slopes
97	Sinnice extremely cindery loamy sand, 30 to 65 percent slopes
98	Sinnice extremely cindery loamy sand, 65 to 90 percent slopes
99	Sinnice extremely cindery loamy sand, cold, 5 to 30 percent slopes
100	Sinnice extremely cindery loamy sand, cold, 30 to 65 percent slopes
101	Sinnice extremely cindery loamy sand, cold, 65 to 90 percent slopes
102	Sinnice, cold-Rock outcrop complex, 65 to 90 percent slopes
103	Skamania very fine sandy loam, 0 to 8 percent slopes
104	Skamania very fine sandy loam, 8 to 15 percent slopes
105	Skamania very fine sandy loam, 15 to 30 percent slopes
106	Skamania very fine sandy loam, 30 to 40 percent slopes
107	Skelida silt loam, 5 to 15 percent slopes
108	Skelida silt loam, 15 to 30 percent slopes
109	Skoly stony loam, 2 to 15 percent slopes
110	Skoly stony loam, 15 to 30 percent slopes
111	Skoly stony loam, 30 to 65 percent slopes
112	Skoly-Rock outcrop complex, 5 to 30 percent slopes
113	Skoly-Rock outcrop complex, 30 to 65 percent slopes
114	St. Helens sandy loam, 0 to 30 percent slopes
115	St. Martin gravelly silty clay loam, 2 to 15 percent slopes
116	St. Martin gravelly silty clay loam, 15 to 30 percent slopes
117	St. Martin gravelly silty clay loam, 30 to 65 percent slopes
118	St. Martin gravelly silty clay loam, slumped, 2 to 30 percent slopes
119	Stabbart clay loam
120	Stabler loam, 0 to 8 percent slopes
121	Stabler loam, 8 to 30 percent slopes
122	Stabler loam, 30 to 65 percent slopes
123	Steever stony clay loam, 2 to 30 percent slopes
124	Steever stony clay loam, 30 to 65 percent slopes
125	Steever-Rock outcrop complex, 2 to 30 percent slopes
126	Steever-Rock outcrop complex, 30 to 65 percent slopes
127	Stevenson loam, 2 to 15 percent slopes
128	Stevenson loam, 15 to 30 percent slopes
129	Stevenson loam, 30 to 50 percent slopes
130	Swift cindery sandy loam, 2 to 30 percent slopes
131	Swift cindery sandy loam, 30 to 65 percent slopes
132	Swift cindery sandy loam, 65 to 90 percent slopes
133	Swift-Rock outcrop complex, 30 to 65 percent slopes
134	Swift-Rock outcrop complex, 65 to 90 percent slopes
135	Timberhead gravelly loam, 5 to 30 percent slopes
136	Timberhead gravelly loam, 30 to 65 percent slopes
137	Tradedollar sandy loam, 0 to 30 percent slopes
138	Tradedollar sandy loam, 30 to 65 percent slopes
139	Tradedollar sandy loam, 65 to 90 percent slopes
140	Tradedollar sandy loam, warm, 0 to 30 percent slopes
141	Tradedollar sandy loam, warm, 30 to 65 percent slopes
142	Tradedollar sandy loam, warm, 65 to 90 percent slopes
143	Typic Dystrandepts, 5 to 65 percent slopes
144	Underwood loam, 2 to 15 percent slopes
145	Underwood loam, 15 to 30 percent slopes
146	Underwood loam, 30 to 50 percent slopes
147	Undusk gravelly loam, 5 to 30 percent slopes
148	Undusk gravelly loam, 30 to 65 percent slopes

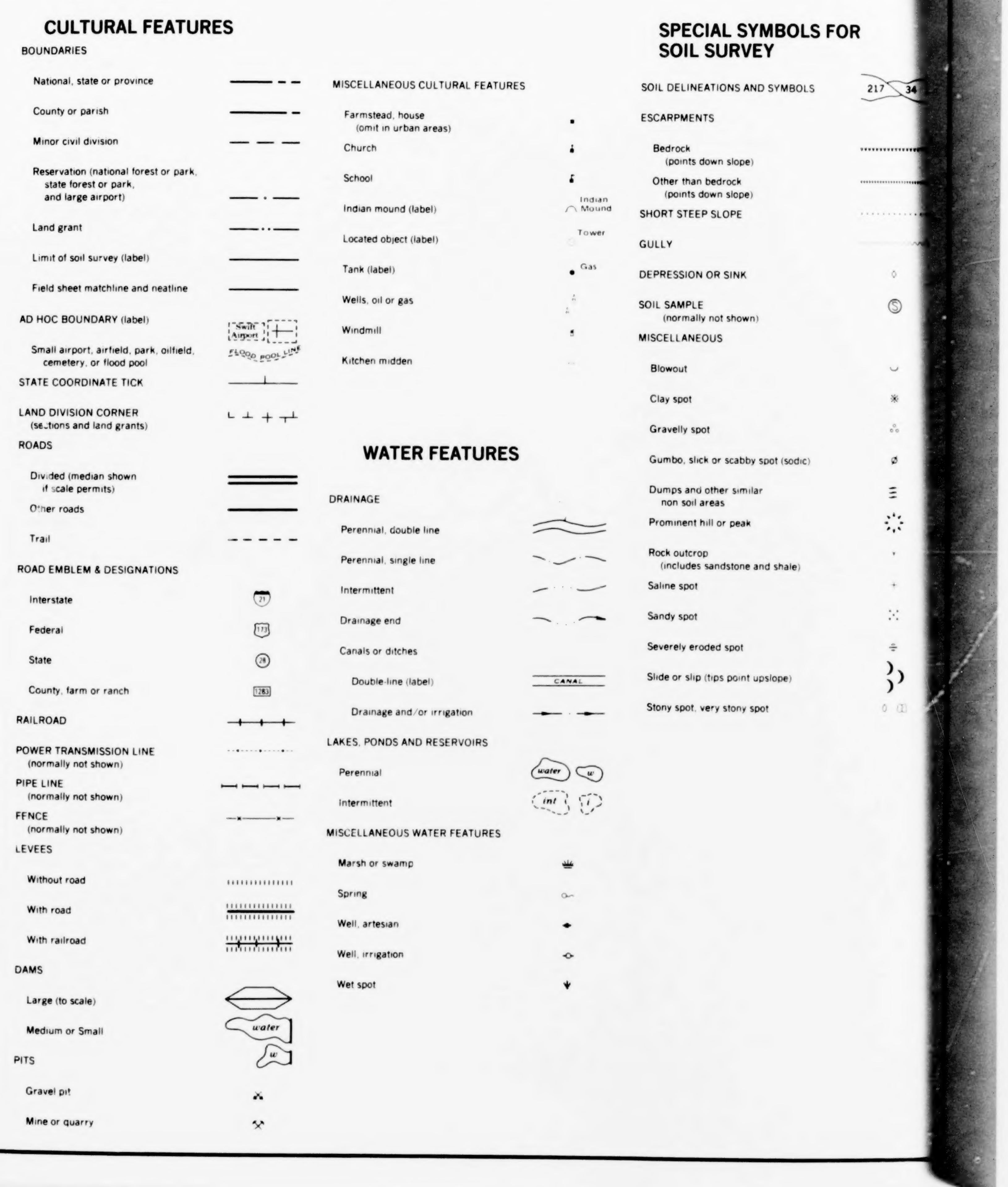
SYMBOL	NAME
149	Vanson sandy loam, 5 to 30 percent slopes
150	Vanson sandy loam, 30 to 65 percent slopes
151	Vanson sandy loam, 65 to 90 percent slopes
152	Vanson sandy loam, cold, 5 to 30 percent slopes
153	Vanson sandy loam, cold, 30 to 65 percent slopes
154	Vanson-Rock outcrop complex, 30 to 65 percent slopes
155	Vanson-Rock outcrop complex, 65 to 90 percent slopes
156	Vanson, cold-Rock outcrop complex, 65 to 90 percent slopes
157	Washougal loam, 0 to 3 percent slopes
158	Washougal gravelly loam, 2 to 8 percent slopes
159	Washougal gravelly loam, 8 to 30 percent slopes
160	Washougal gravelly loam, 30 to 50 percent slopes
161	Xerorthents-Rock outcrop complex, 50 to 90 percent slopes
162	Yalelake sandy loam, 2 to 30 percent slopes
163	Yalelake sandy loam, 30 to 65 percent slopes
164	Yalelake sandy loam, 65 to 90 percent slopes
165	Zygore gravelly loam, 5 to 30 percent slopes
166	Zygore gravelly loam, 30 to 65 percent slopes
167	Zygore-Rock outcrop complex, 30 to 65 percent slopes
168	Zymer sandy loam, 2 to 30 percent slopes
169	Zymer sandy loam, 30 to 65 percent slopes
170	Zymer sandy loam, 65 to 90 percent slopes
171	Zymer-Rock outcrop complex, 30 to 65 percent slopes
172	Zymer-Rock outcrop complex, 65 to 90 percent slopes
173	Zynbar gravelly silt loam, till substratum, 8 to 30 percent slopes

POST-ERUPTION MAP UNITS

SYMBOL	NAME
200	Bandid extremely cindery loamy sand, overblown, 5 to 30 percent slopes
201	Bandid extremely cindery loamy sand, overblown, 30 to 65 percent slopes
202	Bandid extremely cindery loamy sand, overblown, 65 to 90 percent slopes
203	Cattcreek loamy sand, overblown, cold, 30 to 65 percent slopes
204	Cattcreek loamy sand, overblown, cold, 65 to 90 percent slopes
205	Cinnamon loamy sand, overblown, 2 to 30 percent slopes
206	Colter loamy sand, overblown, 0 to 30 percent slopes
207	Colter loamy sand, overblown, 30 to 65 percent slopes
208	Colter loamy sand, overblown, 65 to 90 percent slopes
209	Colter loamy sand, overblown, cold, 0 to 30 percent slopes
210	Colter loamy sand, overblown, cold, 30 to 65 percent slopes
211	Colter loamy sand, overblown, cold, 65 to 90 percent slopes
212	Colter extremely cindery loamy sand, overblown, 30 to 65 percent slopes
213	Colter, overblown, cold-Rock outcrop complex, 30 to 65 percent slopes
214	Cryandepts extremely cindery loamy sand, overblown, 45 to 120 percent slopes
215	Elkprairie loamy sand, 5 to 30 percent slopes
216	Hatchet loamy sand, overblown, 65 to 90 percent slopes
217	Hatchet loamy sand, overblown, cold, 30 to 65 percent slopes
218	Hatchet loamy sand, overblown, cold, 65 to 90 percent slopes
219	Hatchet, overblown-Rock outcrop complex, 65 to 90 percent slopes
220	Hatchet, overblown, cold-Rock outcrop complex, 30 to 65 percent slopes
221	Hatchet, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes
222	Histic Cryaquepts loamy sand, overblown, 0 to 5 percent slopes
223	Lonestar loamy sand, overblown, 5 to 30 percent slopes
224	Lonestar loamy sand, overblown, 30 to 65 percent slopes
225	Lonestar loamy sand, overblown, 65 to 90 percent slopes

SYMBOL	NAME
226	Minniepeak loamy sand, overblown, 5 to 30 percent slopes
227	Minniepeak loamy sand, overblown, 30 to 65 percent slopes
228	Minniepeak extremely cindery loamy sand, overblown, 30 to 65 percent slopes
229	Minniepeak extremely cindery loamy sand, overblown, 65 to 90 percent slopes
230	Obscurity very bouldery sand, 0 to 30 percent slopes
231	Panhandle extremely cindery loamy sand, 0 to 20 percent slopes
232	Pelee extremely cindery loamy sand, overblown, 5 to 30 percent slopes
233	Pelee extremely cindery loamy sand, overblown, 30 to 65 percent slopes
234	Pelee extremely cindery loamy sand, overblown, 65 to 90 percent slopes
235	Pelee overblown-Rock outcrop complex, 65 to 90 percent slopes
236	Polepatch loamy sand, overblown, 0 to 30 percent slopes
237	Rock outcrop-Cattcreek, overblown, cold complex, 65 to 90 percent slopes
238	Shoestring loamy sand, overblown, 0 to 30 percent slopes
239	Shoestring loamy sand, overblown, 50 to 90 percent slopes
240	Sinnice extremely cindery loamy sand, overblown, 5 to 30 percent slopes
241	Sinnice extremely cindery loamy sand, overblown, 30 to 65 percent slopes
242	Sinnice extremely cindery loamy sand, overblown, 65 to 90 percent slopes
243	Sinnice extremely cindery loamy sand, overblown, cold, 5 to 30 percent slopes
244	Sinnice extremely cindery loamy sand, overblown, cold, 30 to 65 percent slopes
245	Sinnice extremely cindery loamy sand, overblown, cold, 65 to 90 percent slopes
246	Sinnice, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes
247	Sinnice loamy sand, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes
248	Studebaker very gravelly loamy sand, 0 to 20 percent slopes
249	Swift loamy sand, overblown, 2 to 30 percent slopes
250	Swift, overblown-Rock outcrop complex, 65 to 90 percent slopes
251	Tradedollar loamy sand, overblown, 0 to 30 percent slopes
252	Tradedollar loamy sand, overblown, 30 to 65 percent slopes
253	Tradedollar loamy sand, overblown, 65 to 90 percent slopes
254	Tradedollar loamy sand, overblown, warm, 0 to 30 percent slopes
255	Tradedollar loamy sand, overblown, warm, 30 to 65 percent slopes
256	Tradedollar loamy sand, overblown, warm, 65 to 90 percent slopes
257	Vanson loamy sand, overblown, 5 to 30 percent slopes
258	Vanson loamy sand, overblown, 30 to 65 percent slopes
259	Vanson loamy sand, overblown, 65 to 90 percent slopes
260	Vanson loamy sand, overblown, cold, 5 to 30 percent slopes
261	Vanson loamy sand, overblown, cold, 30 to 65 percent slopes
262	Vanson extremely cindery loamy sand, overblown, 65 to 90 percent slopes
263	Vanson, overblown-Rock outcrop complex, 30 to 65 percent slopes
264	Vanson, overblown-Rock outcrop complex, 65 to 90 percent slopes
265	Vanson, overblown, cold-Rock outcrop complex, 65 to 90 percent slopes
266	Wakepish very gravelly sandy loam, 0 to 30 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND



CULTURAL FEATURES

BOUNDARIES
- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS
- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or Small

PITS
- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

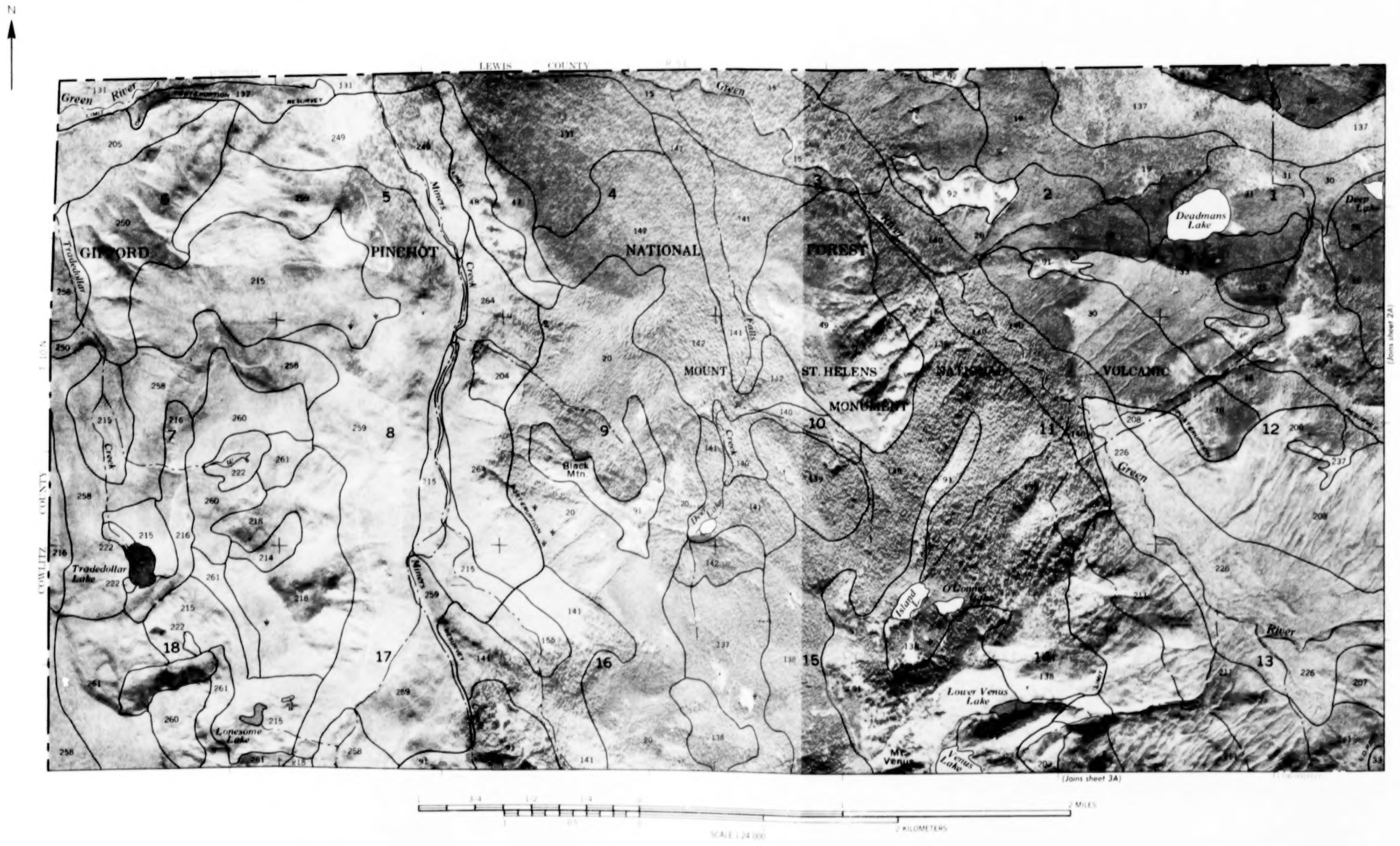
SOIL SAMPLE (normally not shown)

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

1A

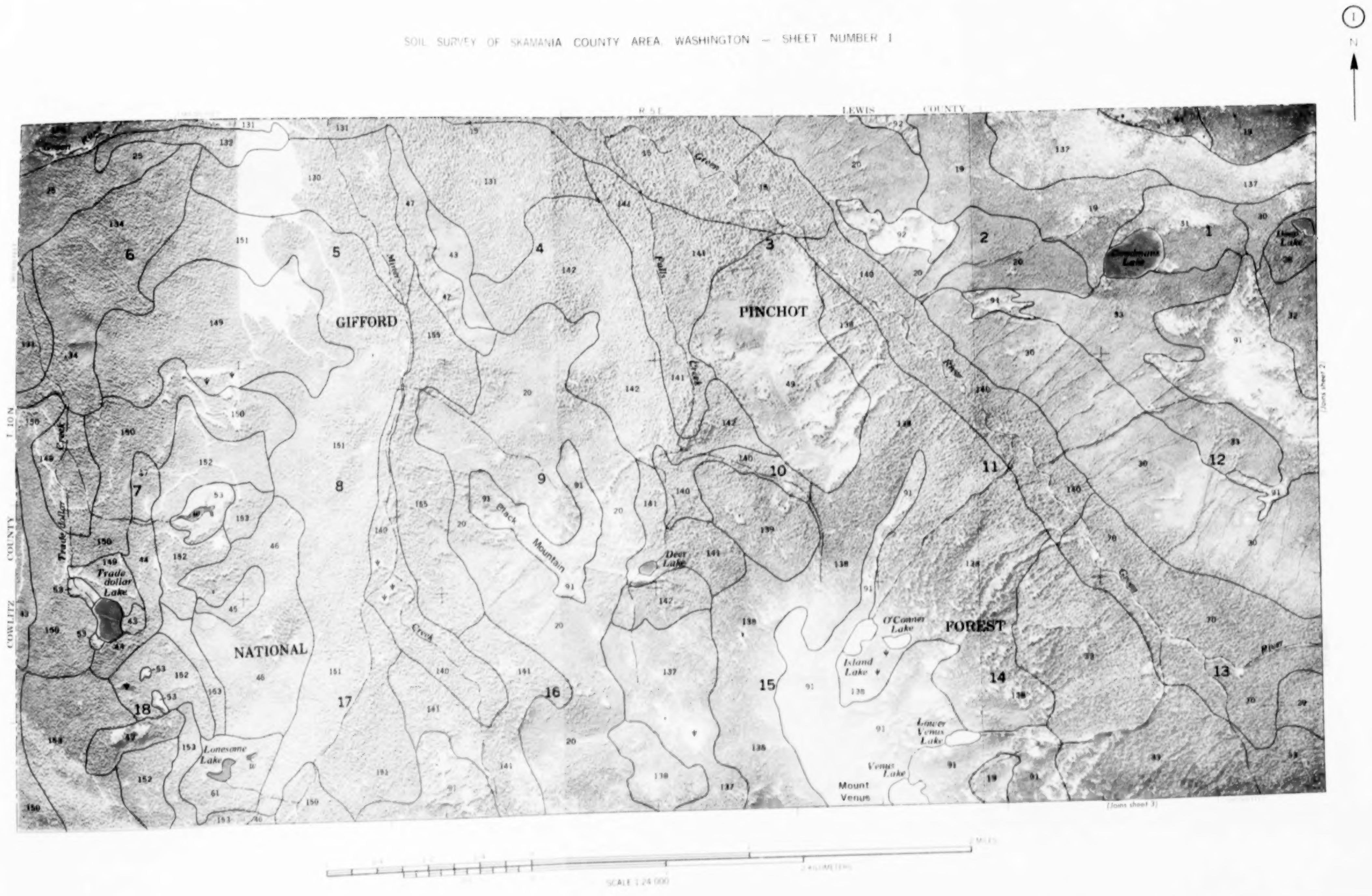
POST ERUPTION

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 1A


N
LEWIS COUNTY
Green River
POST ERUPTION
GIFFORD
PINCHOT
NATIONAL
FOREST
MOUNT ST HELENS NATIONAL VOLCANIC MONUMENT
Deadmans Lake
Deep Lake
Miners Creek
Tradedollar Lake
Lonesome Lake
Lower Venus Lake
Mt Venus
Venus Lake
Green River
(Joins sheet 3A)
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 1

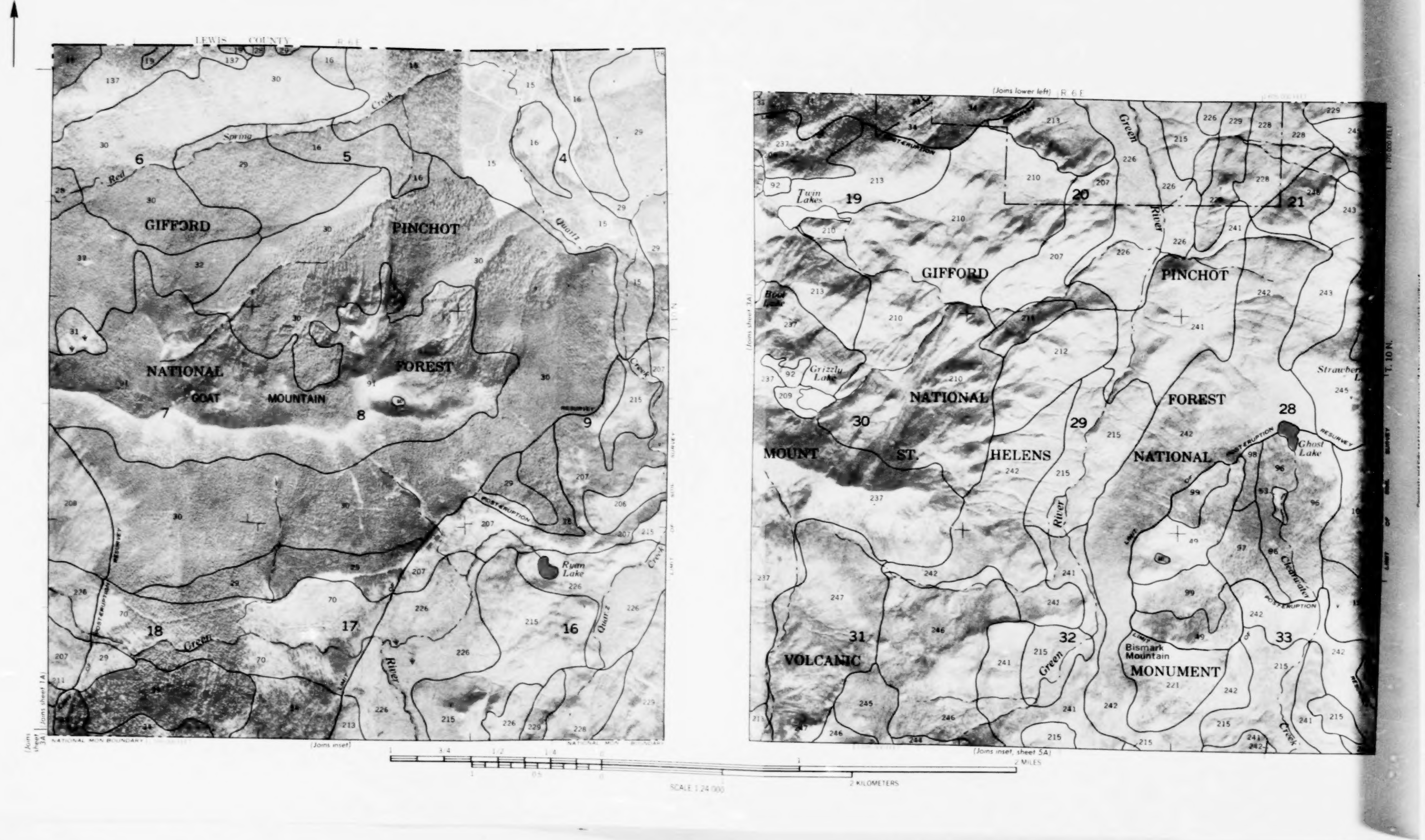
1


N
R 5 E
LEWIS COUNTY
Green
GIFFORD
PINCHOT
NATIONAL
FOREST
Deadmans Lake
Deep Lake
Tradedollar Lake
Lonesome Lake
Deer Lake
O'Connor Lake
Island Lake
Lower Venus Lake
Venus Lake
Mount Venus
(Joins sheet 3)
SCALE 1:24 000
2 MILES
2 KILOMETERS

2A

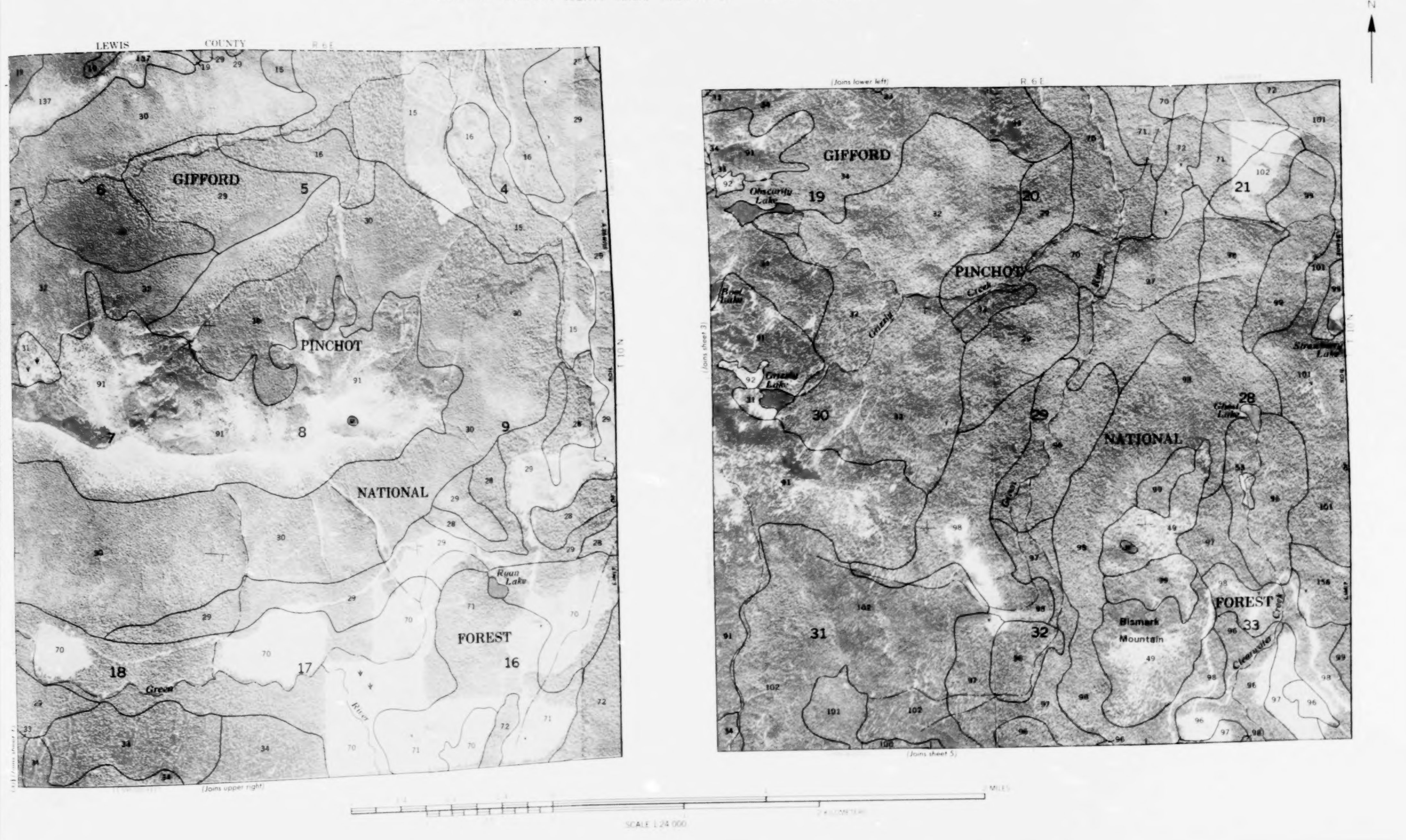
POST ERUPTION

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 2A


N
LEWIS COUNTY
R. 6 E.
(Joins lower left)
GIFFORD
PINCHOT
NATIONAL
FOREST
GOAT MOUNTAIN
Ryan Lake
MOUNT ST. HELENS
NATIONAL
VOLCANIC
MONUMENT
Twin Lakes
Grizzly Lake
Ghost Lake
Bismark Mountain
Strawberry
(Joins inset)
(Joins inset sheet 5A)
SCALE 1:24 000
2 KILOMETERS
2 MILES
6
5
4
7
8
9
18
17
16
19
20
21
28
29
30
31
32
33

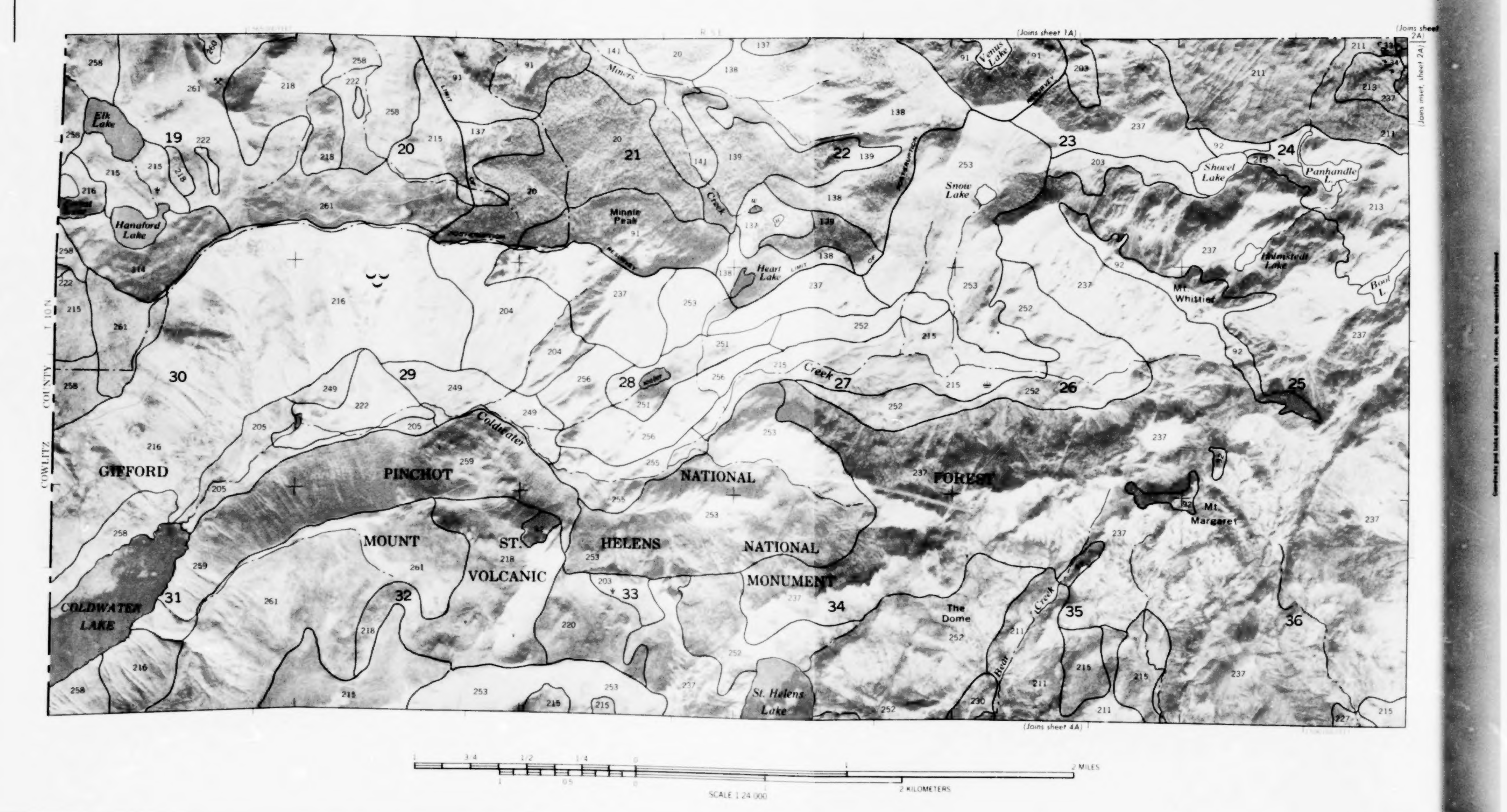
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 2

2

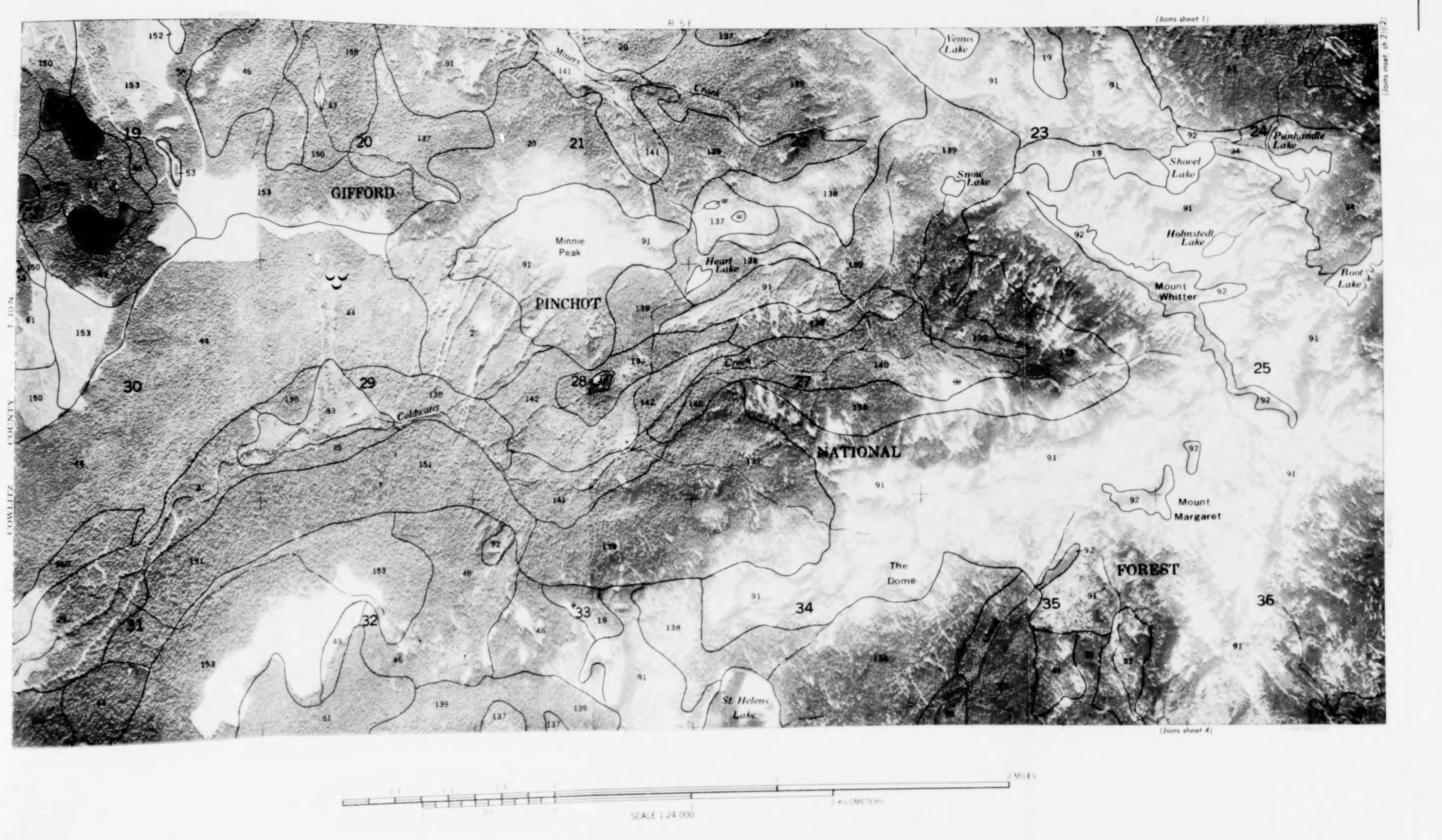

N
LEWIS COUNTY
R. 6 E.
(Joins lower left)
GIFFORD
PINCHOT
NATIONAL
FOREST
Ryan Lake
Grizzly Lake
Ghost Lake
Bismark Mountain
(Joins upper right)
(Joins sheet 5)
SCALE 1:24 000
2 KILOMETERS
2 MILES
6
5
4
8
9
18
17
16
19
20
21
28
29
30
31
32
33

POST ERUPTION

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 3A

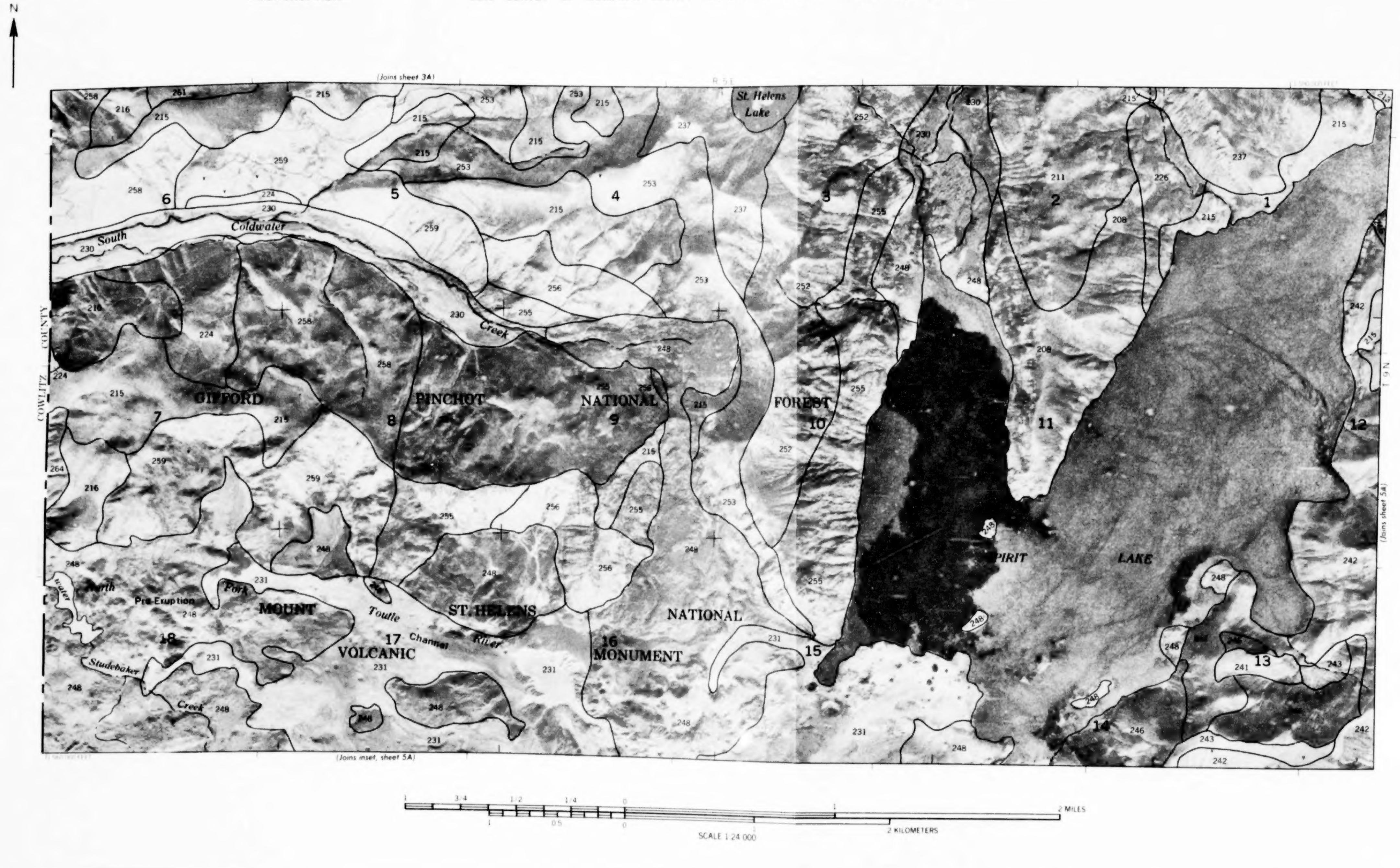

3A
N
(Joins sheet 1A)
(Joins sheet 2A)
(Joins sheet 4A)
Elk Lake
Hanaford Lake
Minnie Peak
Snow Lake
Heart Lake
Shovel Lake
Panhandle Lake
Holmstedt Lake
Boot Lake
Mt. Whittier
Mt. Margaret
The Dome
St. Helens Lake
COLDWATER LAKE
Coldwater
Creek
GIFFORD
PINCHOT
NATIONAL
FOREST
MOUNT
ST.
HELENS
NATIONAL
VOLCANIC
MONUMENT
COWLITZ COUNTY
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
SCALE 1:24 000
1 MILE
2 KILOMETERS

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 3


3
N
(Joins sheet 1)
(Joins sheet 2)
(Joins sheet 4)
Venus Lake
Minnie Peak
Snow Lake
Heart Lake
Shovel Lake
Panhandle Lake
Holmstedt Lake
Boot Lake
Mount Whittier
Mount Margaret
The Dome
St. Helens Lake
Coldwater
Creek
GIFFORD
PINCHOT
NATIONAL
FOREST
COWLITZ COUNTY
19
20
21
23
24
25
28
29
30
31
32
33
34
35
36
SCALE 1:24 000
1 MILE
2 KILOMETERS

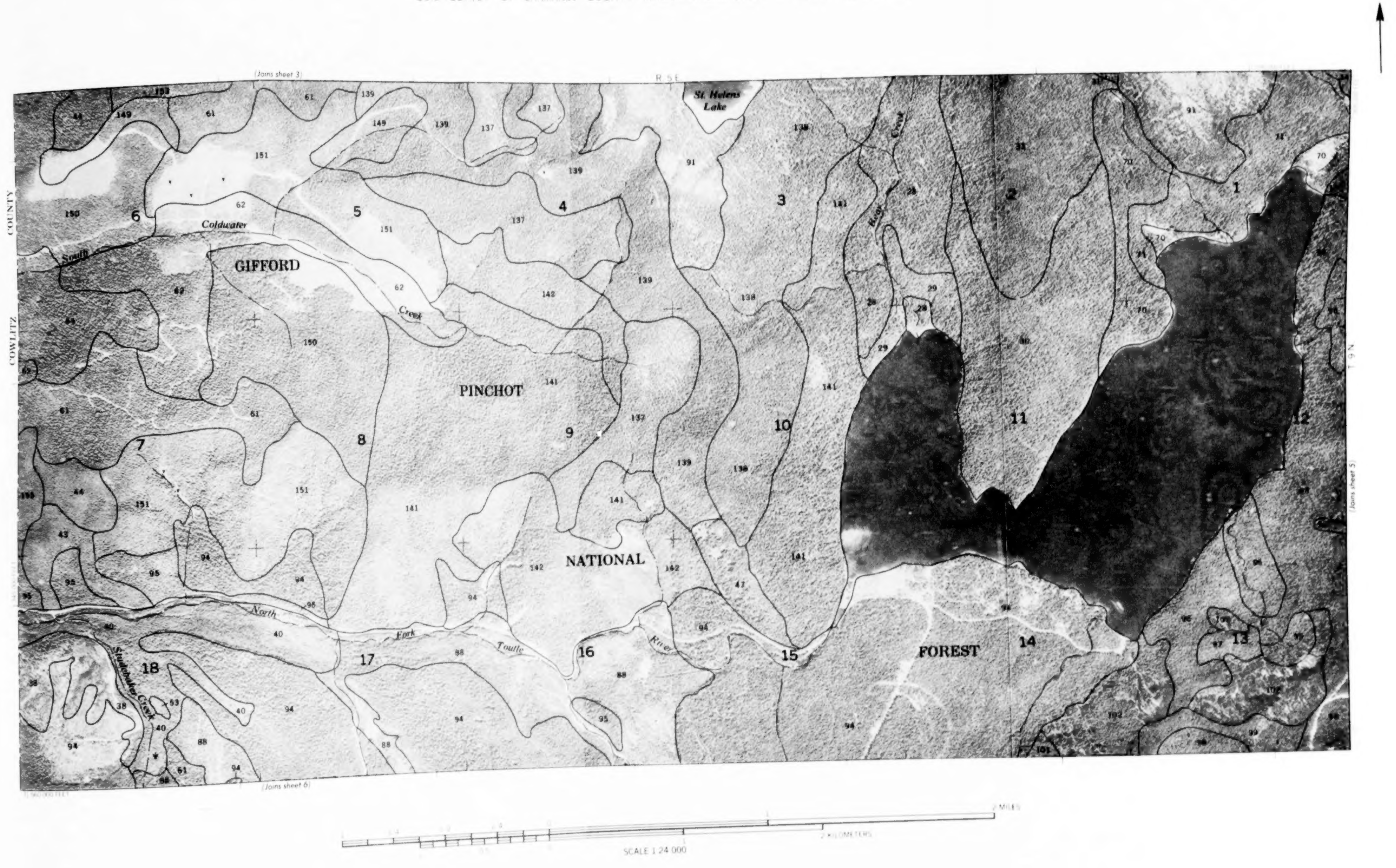
4A

POST ERUPTION SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 4A


N
(Joins sheet 3A)
R. 5 E.
St. Helens Lake
South
Coldwater
Creek
GIFFORD
PINCHOT
NATIONAL
FOREST
Spirit
Lake
North
Fork
Toutle
River
Pre-Eruption Channel
MOUNT
ST. HELENS
VOLCANIC
NATIONAL
MONUMENT
Studebaker
Creek
COWLITZ COUNTY
(Joins sheet 5A)
(Joins sheet 5A)
SCALE 1:24 000
2 KILOMETERS
2 MILES

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 4

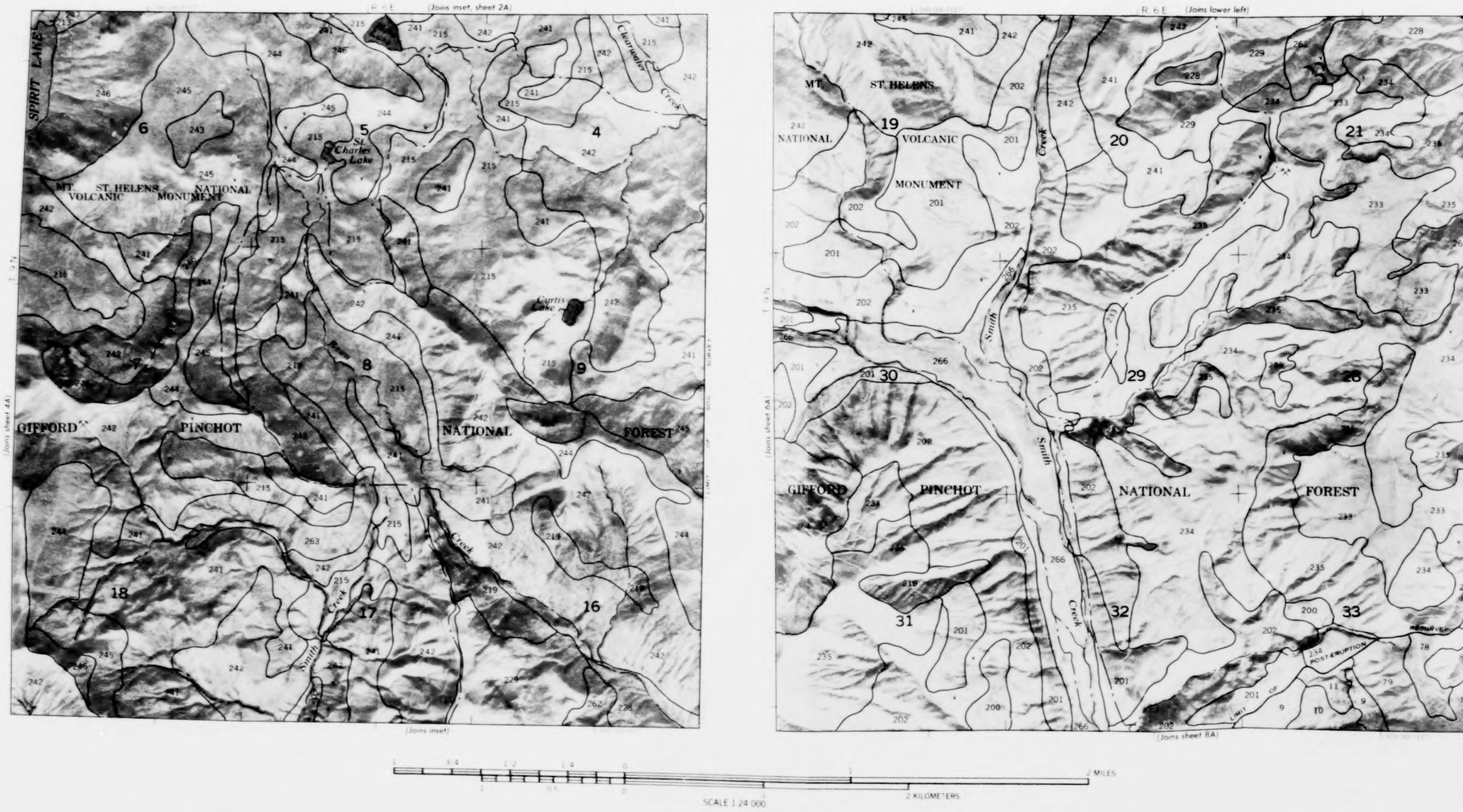
4


N
(Joins sheet 3)
R. 5 E.
St. Helens Lake
South
Coldwater
Creek
GIFFORD
PINCHOT
NATIONAL
FOREST
North
Fork
Toutle
River
COWLITZ COUNTY
(Joins sheet 5)
SCALE 1:24 000
2 KILOMETERS
2 MILES

N

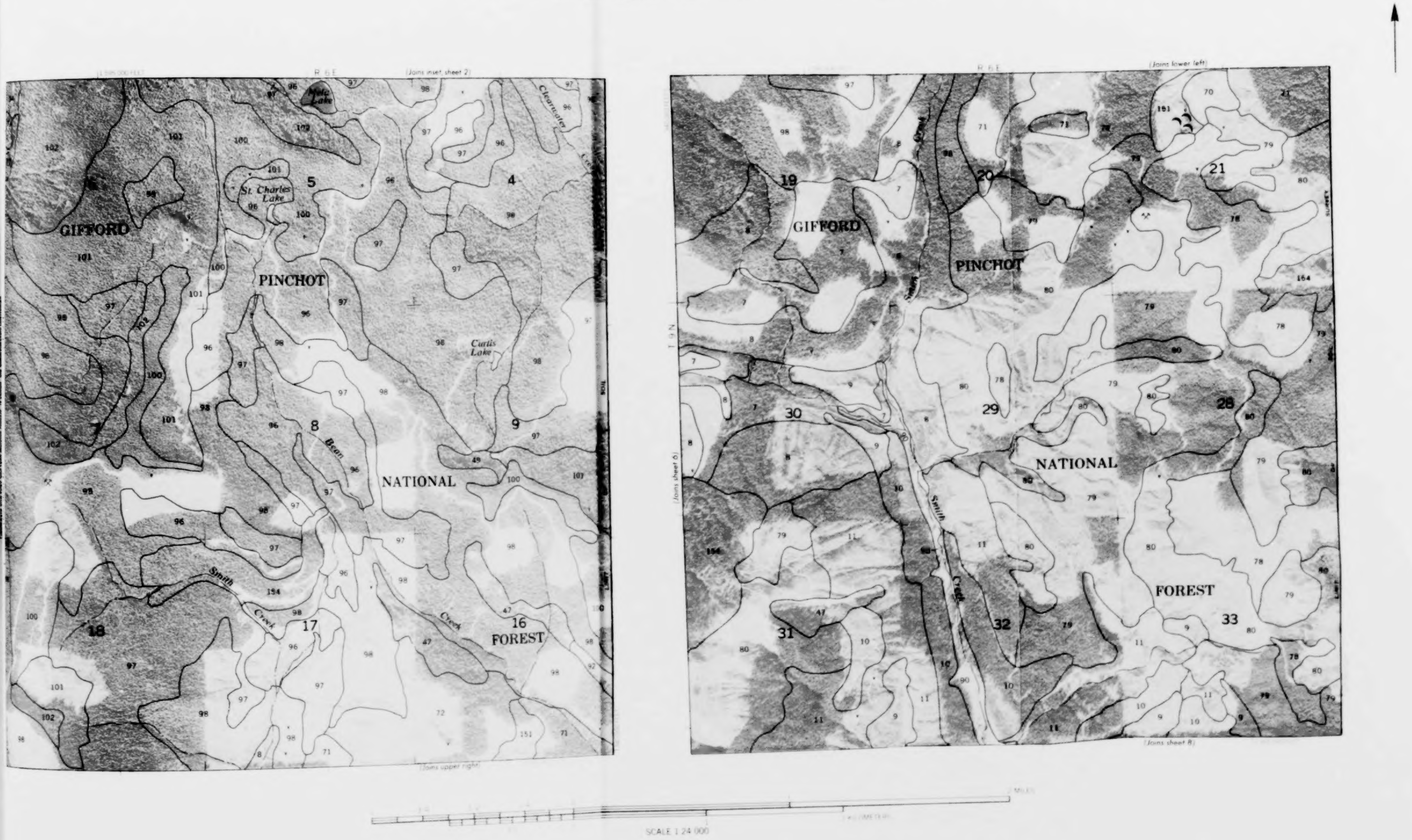
POST ERUPTION

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 5A


R. 6 E.
(Joins inset, sheet 2A)
(Joins lower left)
SPIRIT LAKE
MT. ST. HELENS NATIONAL VOLCANIC MONUMENT
St. Charles Lake
Clearwater Creek
Curtis Lake
GIFFORD PINCHOT NATIONAL FOREST
Smith Creek
(Joins sheet 4A)
(Joins sheet 6A)
(Joins inset)
(Joins sheet 8A)
LIMIT OF SOIL SURVEY
POST-ERUPTION
T. 9 N.
4
5
6
7
8
9
16
17
18
19
20
21
28
29
30
31
32
33
1
1/2
1/4
0
2 MILES
2 KILOMETERS
SCALE 1:24 000

⑤

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 5

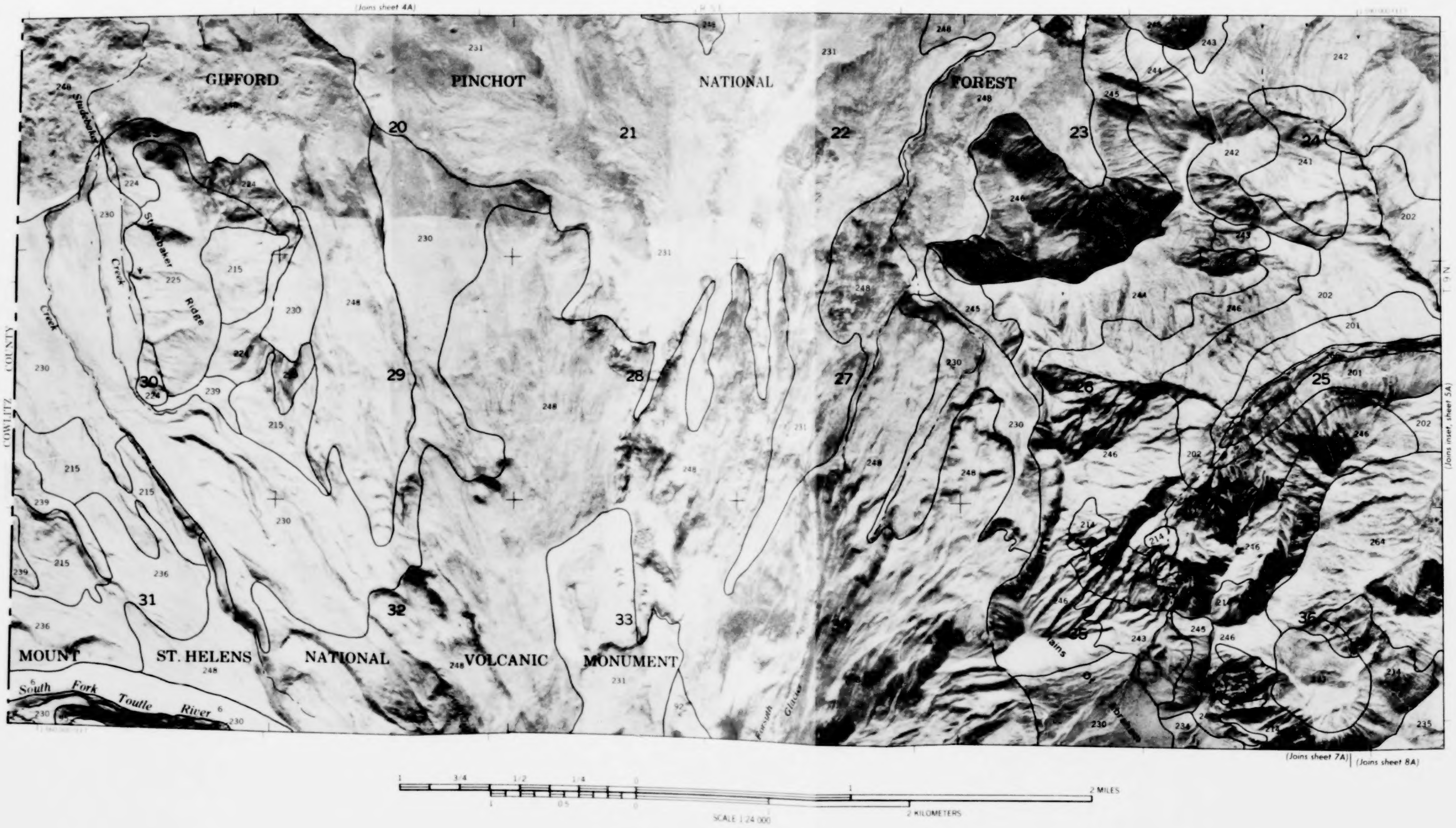

N
R. 6 E.
T. 9 N.
(Joins inset, sheet 2)
(Joins lower left)
(Joins upper right)
(Joins sheet 6)
(Joins sheet 8)
GIFFORD
PINCHOT
NATIONAL
FOREST
St. Charles Lake
Curtis Lake
Clearwater
Bean
Smith Creek
Creek
4
5
8
9
16
17
18
19
20
21
28
29
30
31
32
33
1 MILE
1 KILOMETER
SCALE 1:24 000

(6A)

N

POST ERUPTION

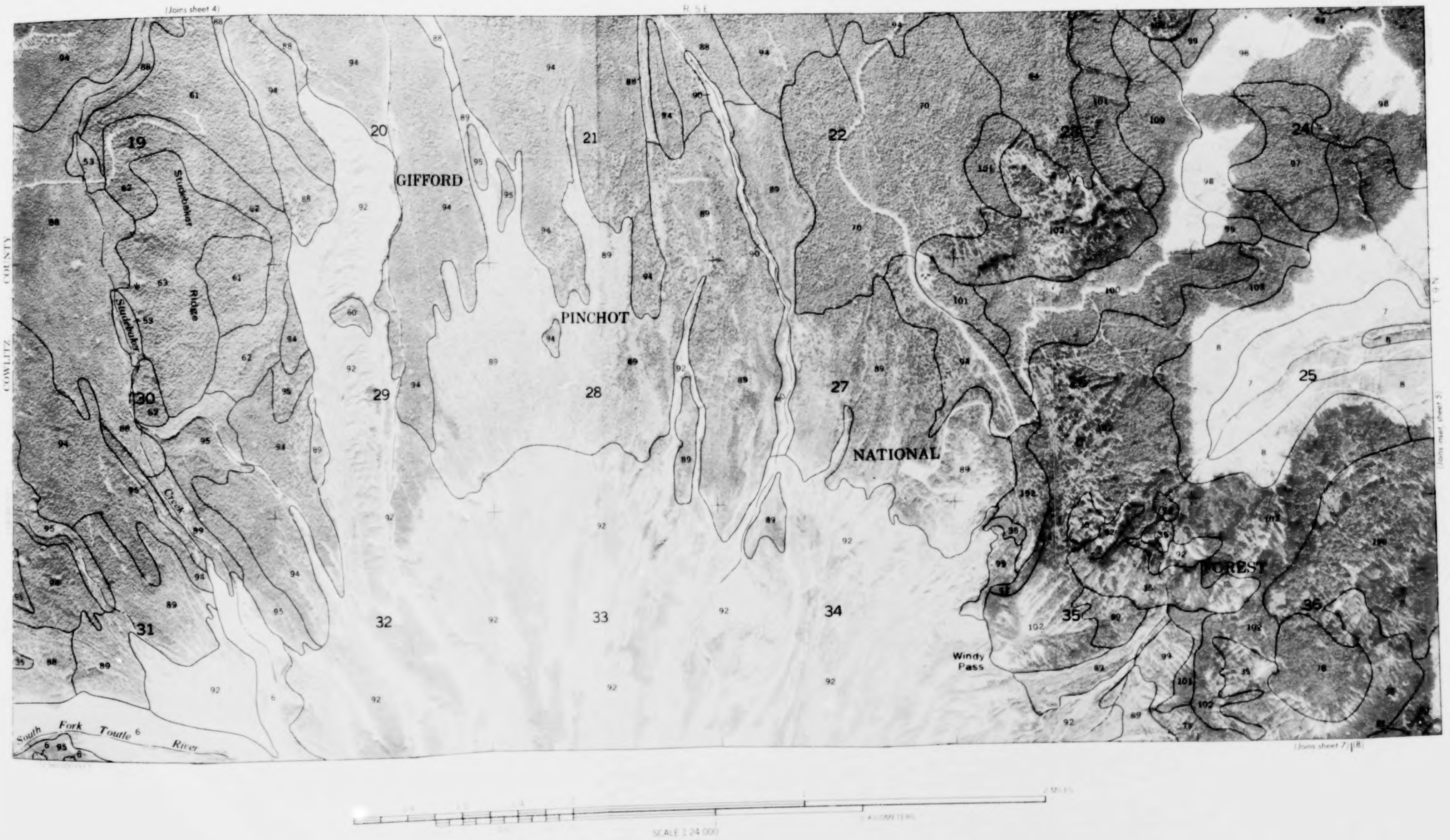
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 6A


(Joins sheet 4A)
GIFFORD
PINCHOT
NATIONAL
FOREST
MOUNT
ST. HELENS
NATIONAL
VOLCANIC
MONUMENT
COWLITZ COUNTY
Studebaker Creek
Studebaker Ridge
Creek
South Fork Toutle River
Forsyth Glacier
Plains of Abraham
20
21
22
23
24
25
26
27
28
29
30
31
32
33
35
36
201
202
215
224
225
230
231
236
239
241
242
243
244
245
246
248
264
(Joins inset, sheet 5A)
(Joins sheet 7A)
(Joins sheet 8A)
1
3/4
1/2
1/4
0
2 MILES
0.5
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 6

⑥

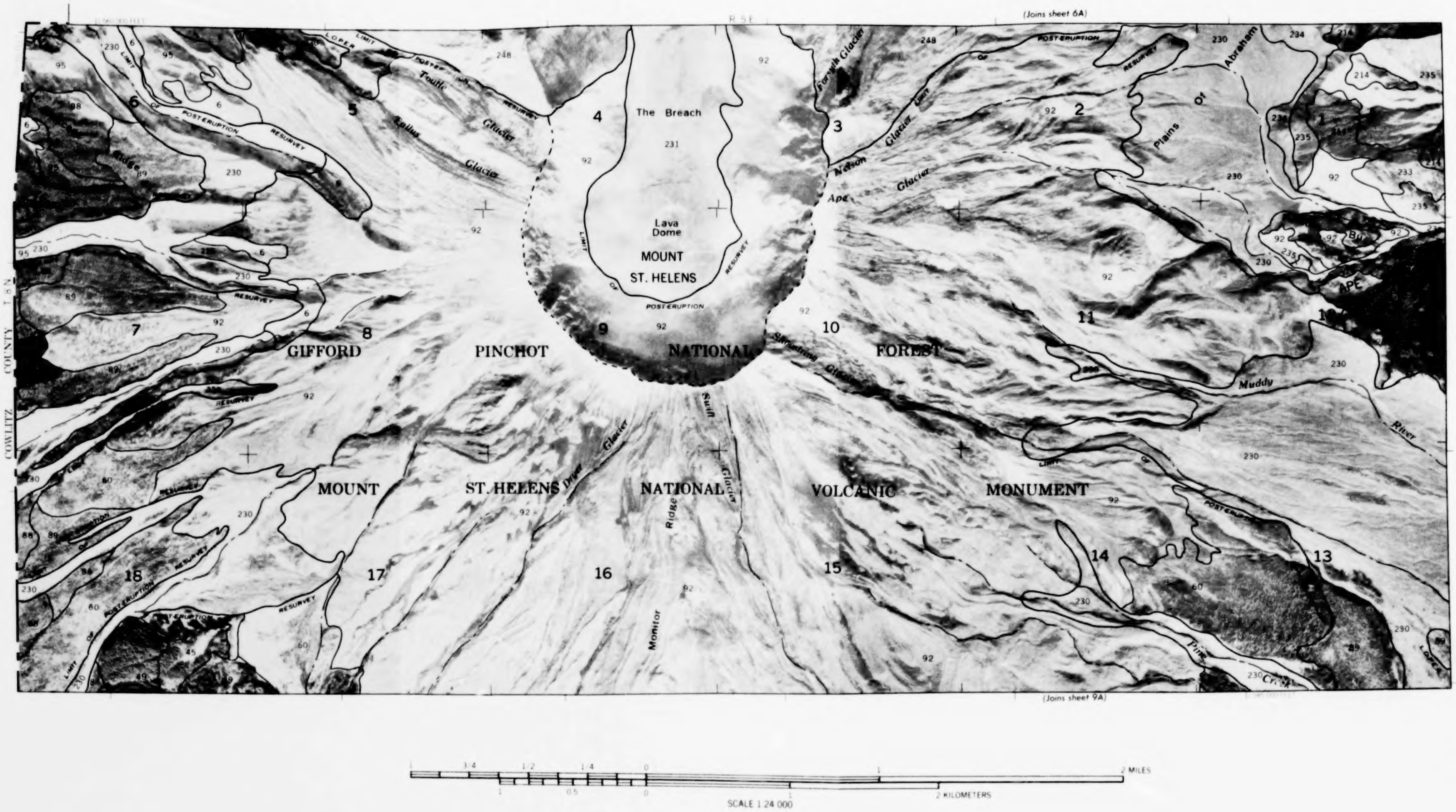
N


(Joins sheet 4)
R. 5 E.
GIFFORD
PINCHOT
NATIONAL
FOREST
COWLITZ COUNTY
Studebaker Ridge
Studebaker Creek
South Fork Toutle River
Windy Pass
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
(Joins sheet 5)
(Joins sheet 7 | 8)
SCALE 1:24 000
2 MILES
2 KILOMETERS

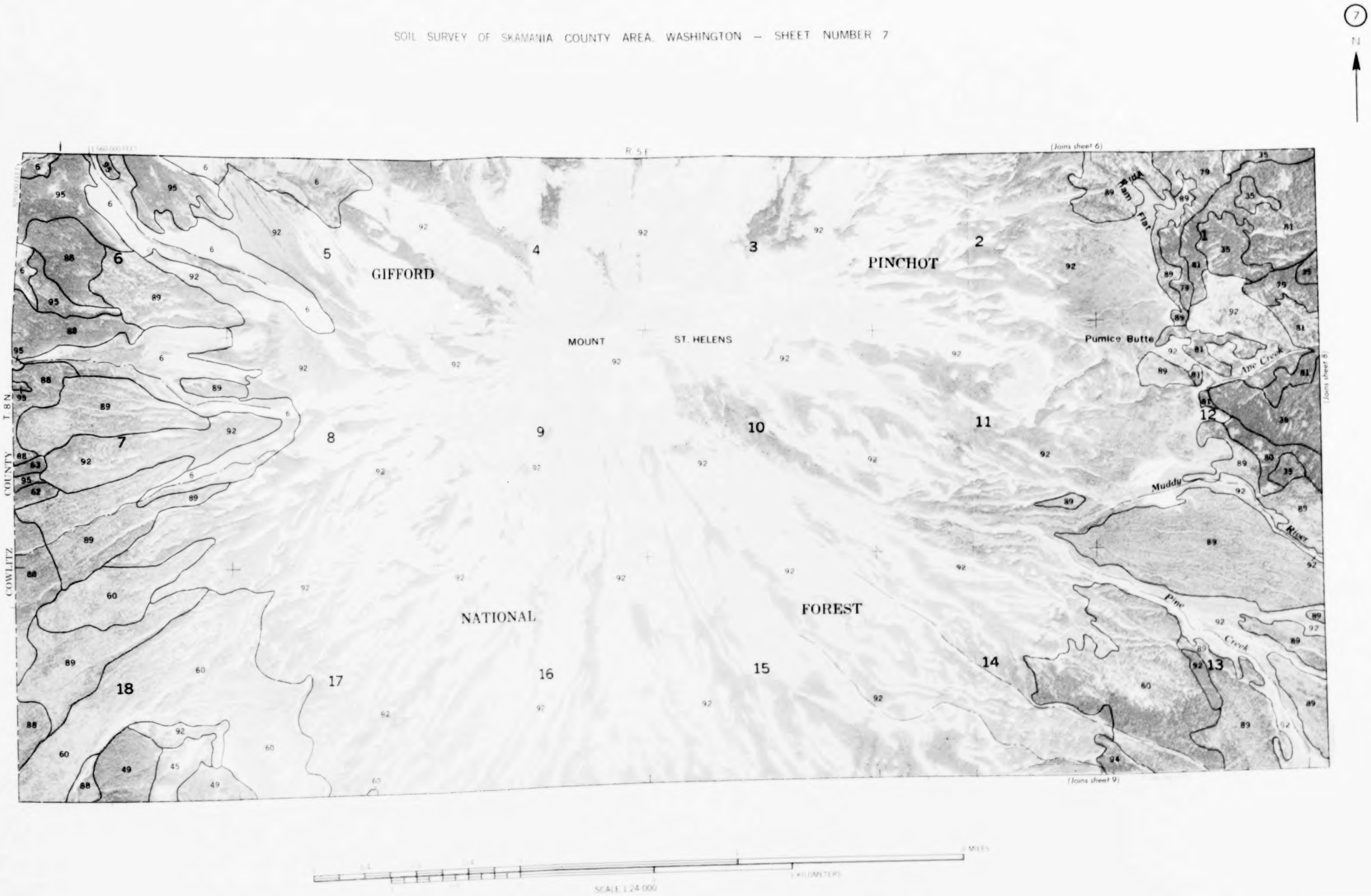
(7A)

POST ERUPTION

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 7A


(Joins sheet 6A)
(Joins sheet 9A)
R 5 E
COWLITZ COUNTY
The Breach
Lava Dome
MOUNT ST. HELENS
LIMIT OF POSTERUPTION RESURVEY
GIFFORD PINCHOT NATIONAL FOREST
MOUNT ST. HELENS NATIONAL VOLCANIC MONUMENT
Toutle Glacier
Loowit Glacier
Talus Glacier
Forsyth Glacier
Nelson Glacier
Ape Glacier
Shoestring Glacier
Swift Glacier
Dryer Glacier
Plains of Abraham
Monitor Ridge
Muddy River
Pine Creek
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
6
60
89
92
95
230
231
233
234
235
248
SCALE 1:24 000
2 MILES
2 KILOMETERS

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 7

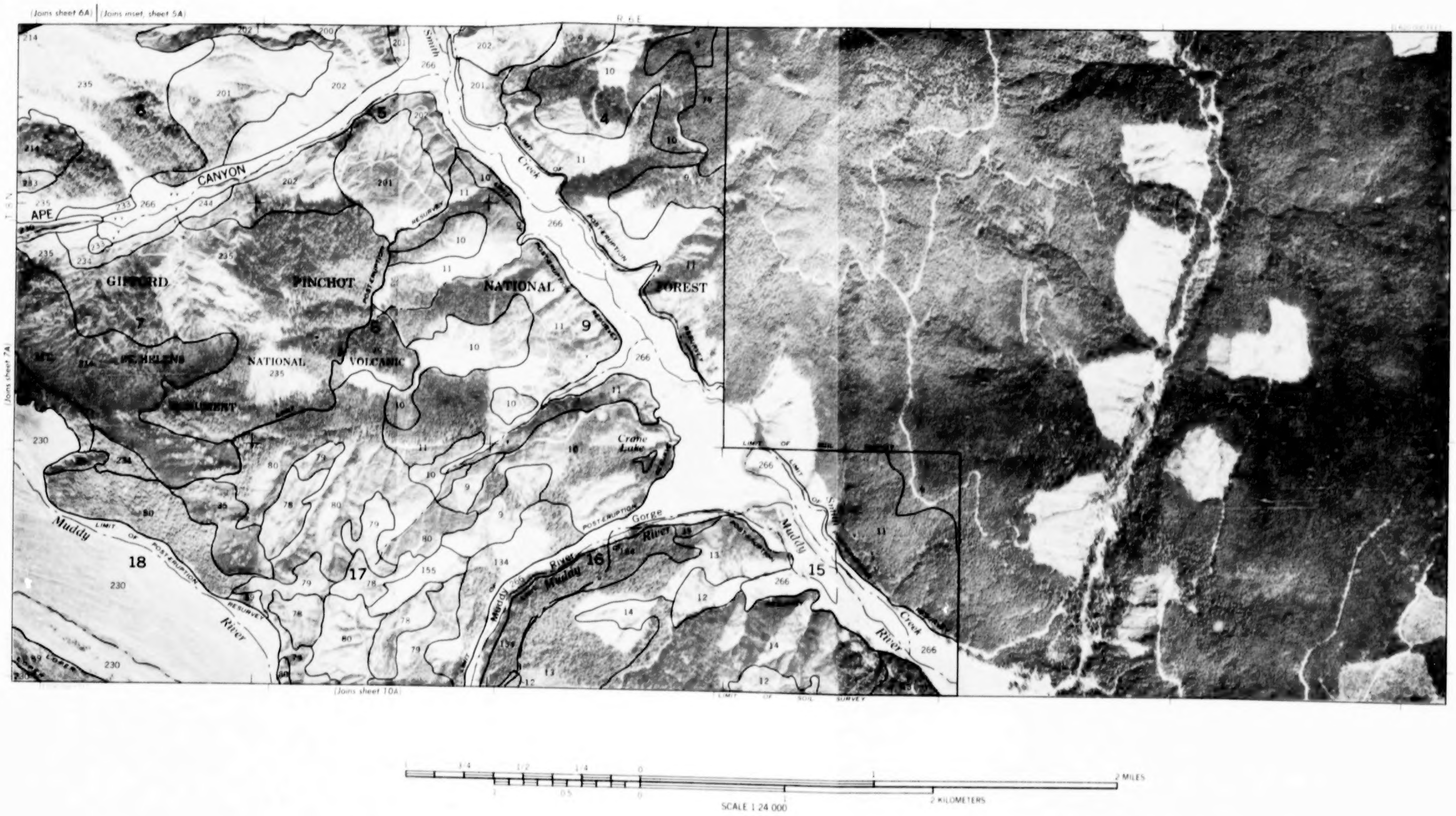


⑦
N
R. 5 E.
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 9)
T. 8 N.
COWLITZ COUNTY
GIFFORD
PINCHOT
NATIONAL
FOREST
MOUNT
ST. HELENS
Pumice Butte
Ram Flat
Ape Creek
Muddy River
Pine Creek
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
6
95
88
89
92
60
49
45
62
63
35
79
81
94
SCALE 1:24 000
2 MILES
2 KILOMETERS

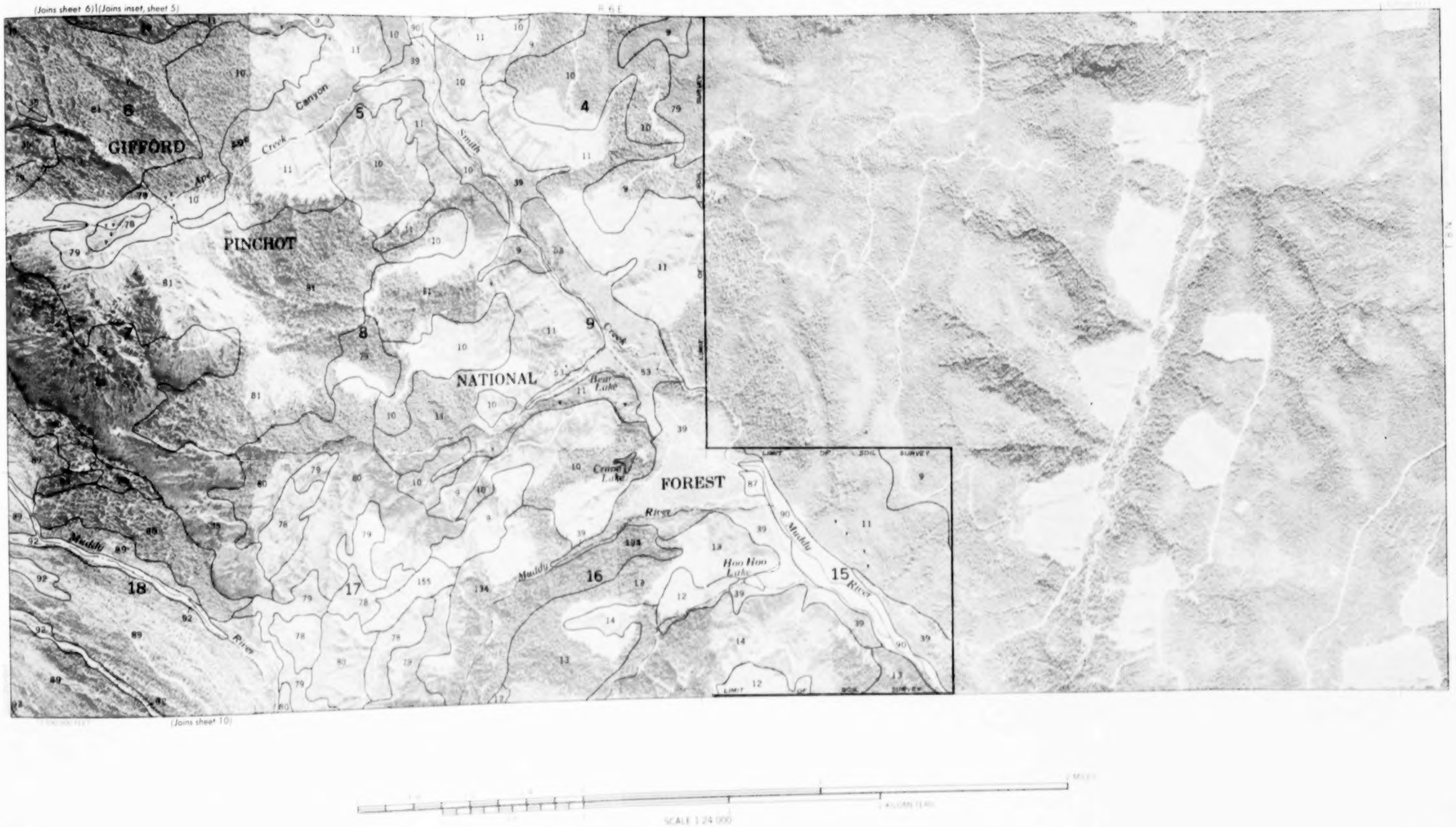
ⓢ8A

N

POST ERUPTION SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 8A


(Joins sheet 6A)
(Joins inset, sheet 5A)
R. 6 E.
T. 9 N.
(Joins sheet 7A)
(Joins sheet 10A)
APE
CANYON
Smith
Creek
GIFFORD
PINCHOT
NATIONAL
FOREST
MT. ST. HELENS
NATIONAL
VOLCANIC
MONUMENT
Crane Lake
Muddy
River
Gorge
LIMIT OF POST-ERUPTION RESURVEY
LIMIT OF SOIL SURVEY
5
6
7
9
15
16
17
18
10
11
12
13
14
78
79
80
134
155
200
201
202
214
230
233
234
235
244
266
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 8

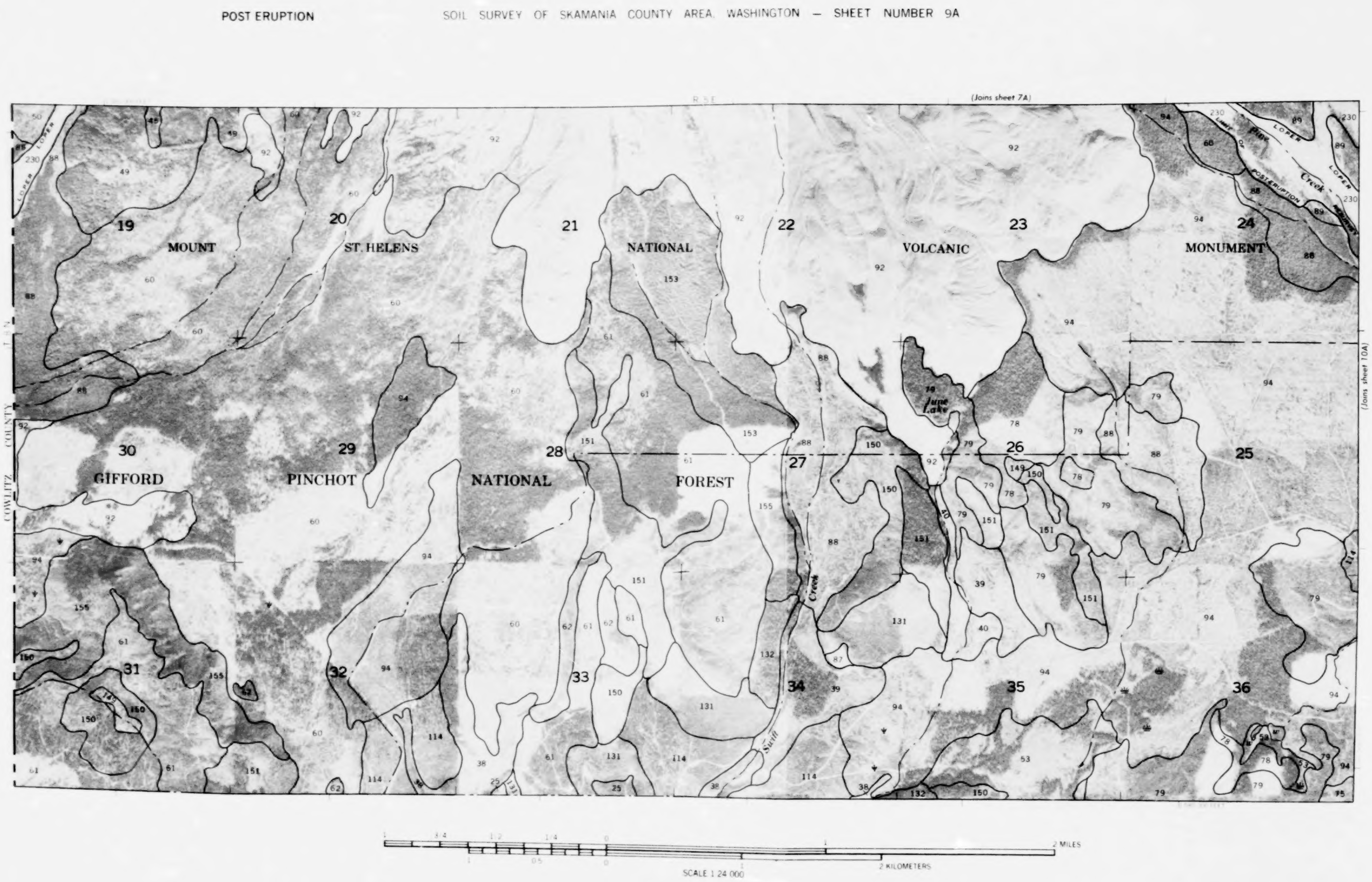

(Joins sheet 6)|(Joins inset, sheet 5)
R. 6 E.
GIFFORD
PINCHOT
NATIONAL
FOREST
Canyon
Creek
Smith
Creek
Bear Lake
Crane Lake
Muddy
River
Hoo Hoo Lake
LIMIT OF SOIL SURVEY
(Joins sheet 10)
2 MILES
1 KILOMETERS
SCALE 1:24 000

8
N

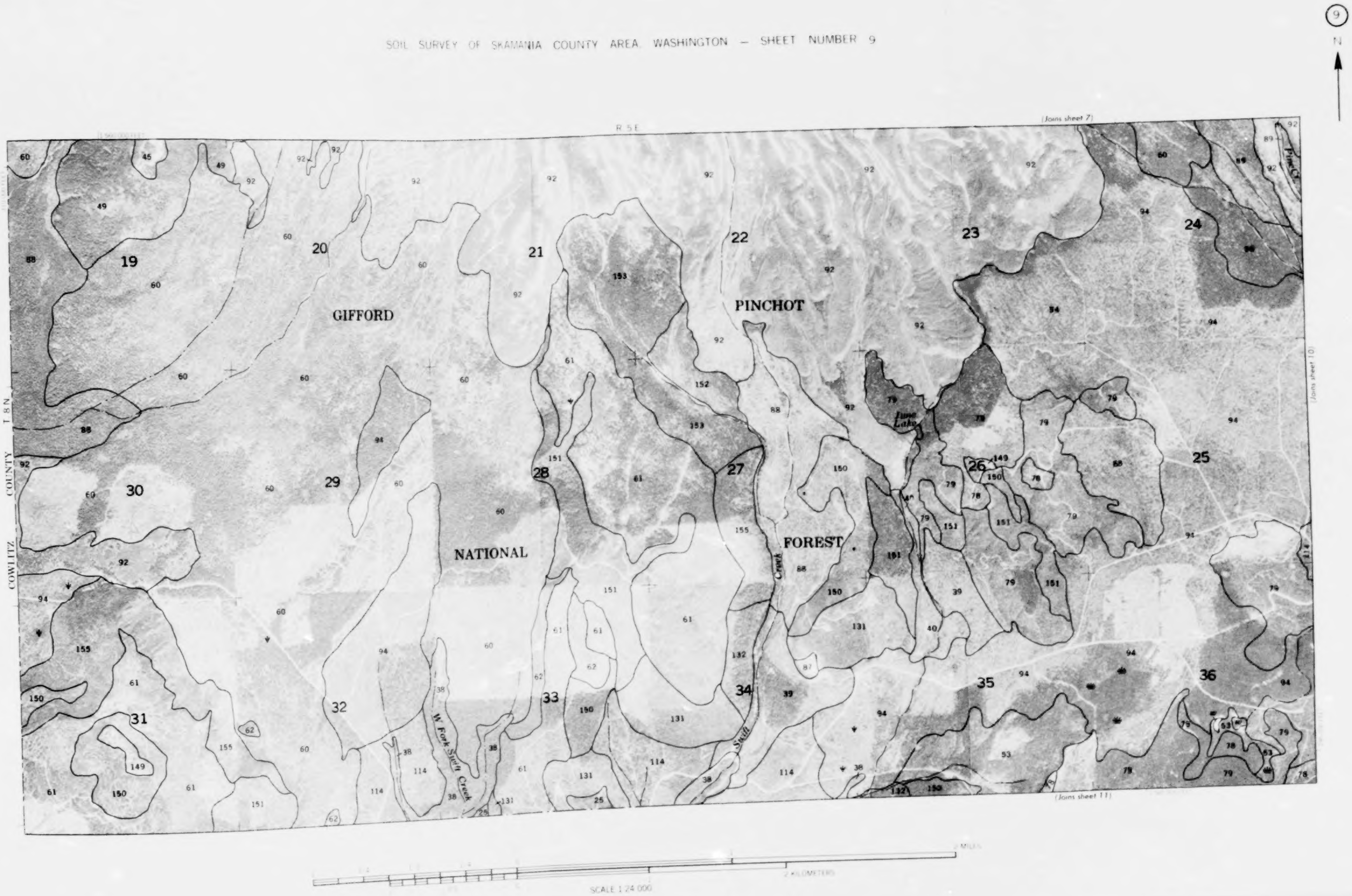
⑨A

POST ERUPTION

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 9A


N
(Joins sheet 7A)
(Joins sheet 10A)
R.5 E.
COWLITZ COUNTY
MOUNT
ST. HELENS
NATIONAL
VOLCANIC
MONUMENT
GIFFORD
PINCHOT
NATIONAL
FOREST
June Lake
Swift Creek
Pine Creek
LOPER
POSTERUPTION
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
2 MILES
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 9


9
N
R. 5 E.
(Joins sheet 7)
(Joins sheet 10)
(Joins sheet 11)
T. 8 N.
COWLITZ COUNTY
GIFFORD
PINCHOT
NATIONAL
FOREST
June Lake
Swift Creek
W Fork Swift Creek
Pine Cr.
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
2 MILES
2 KILOMETERS

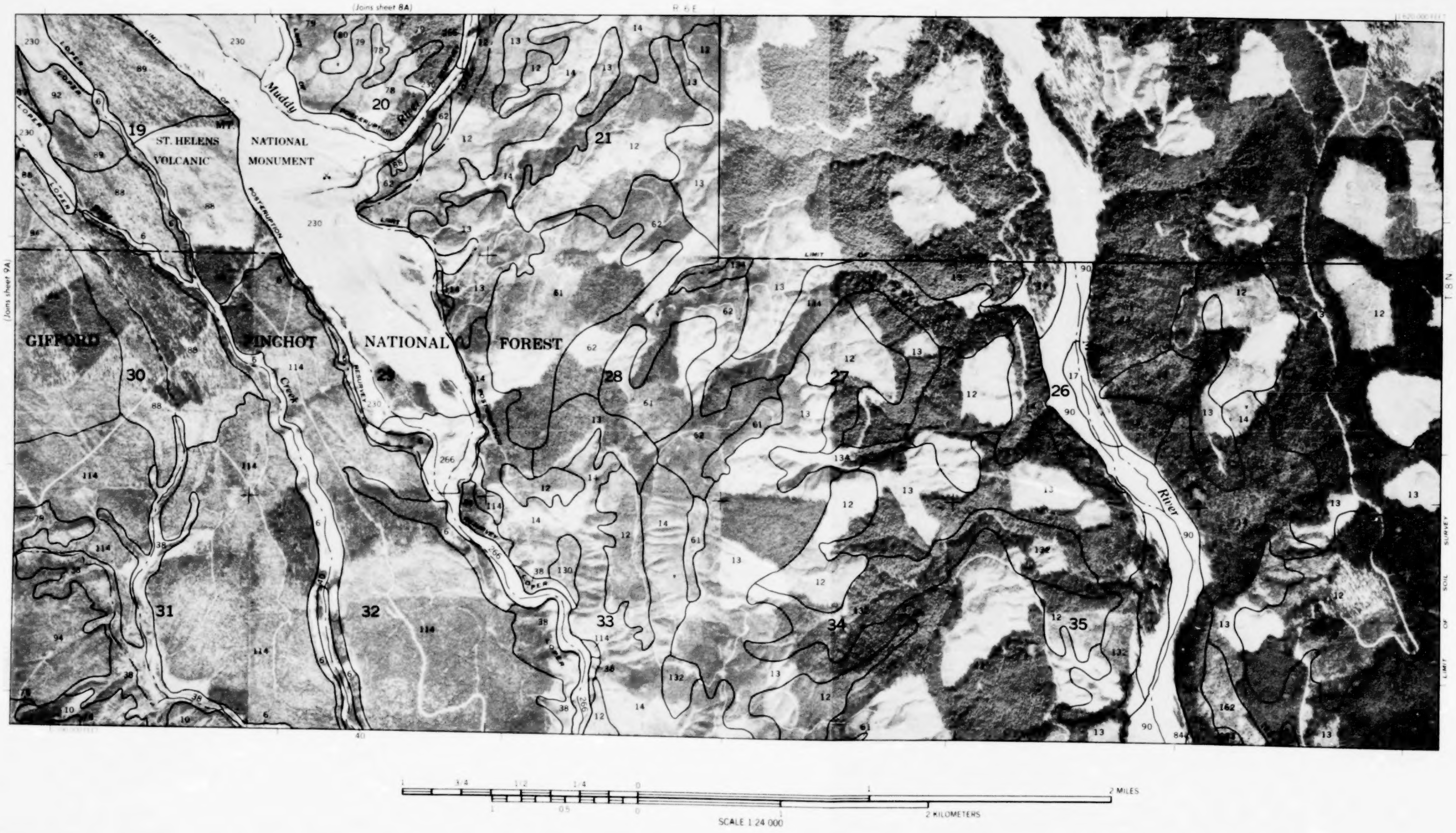
SCALE 1:24 000

(10A)

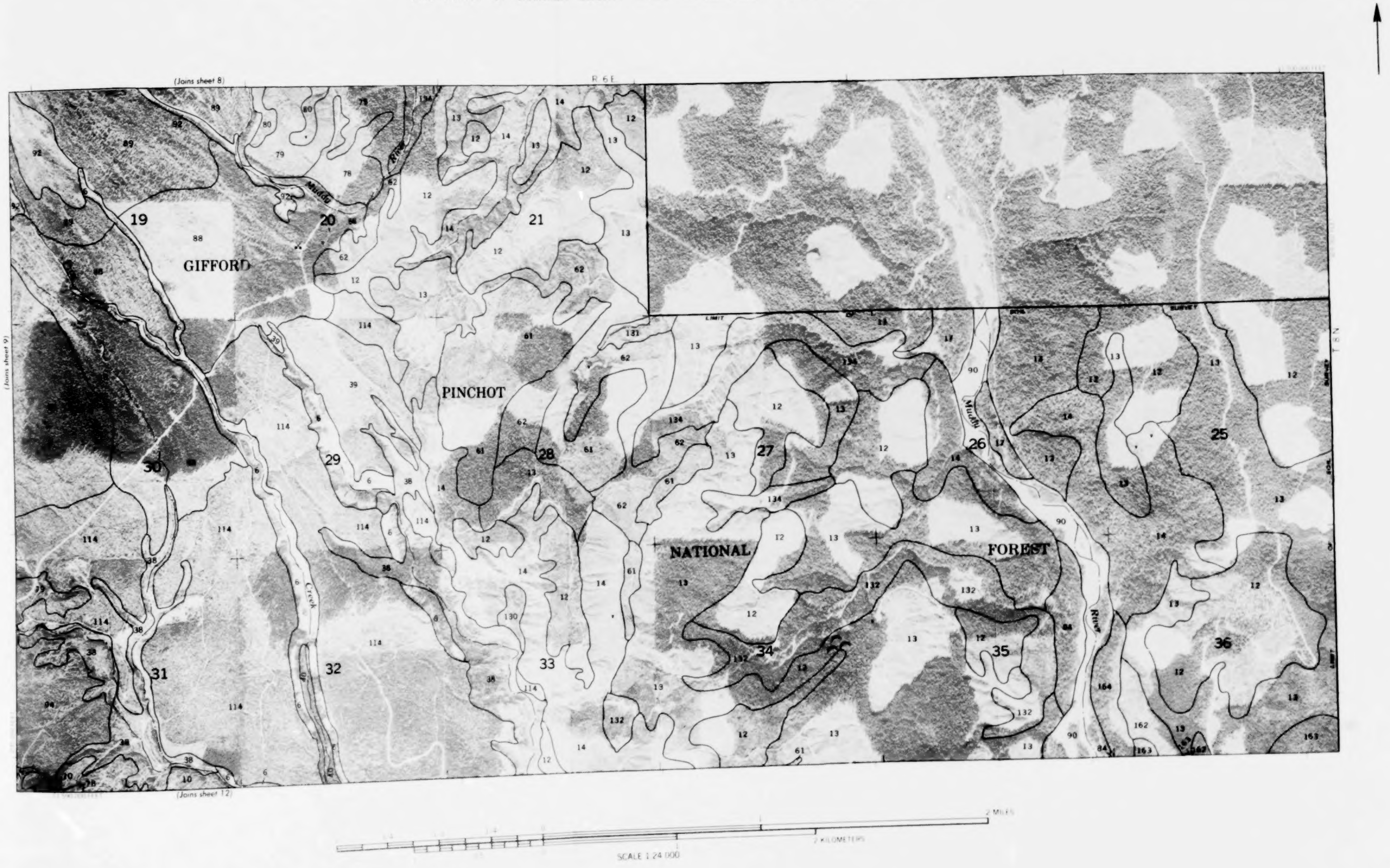
N

POST ERUPTION

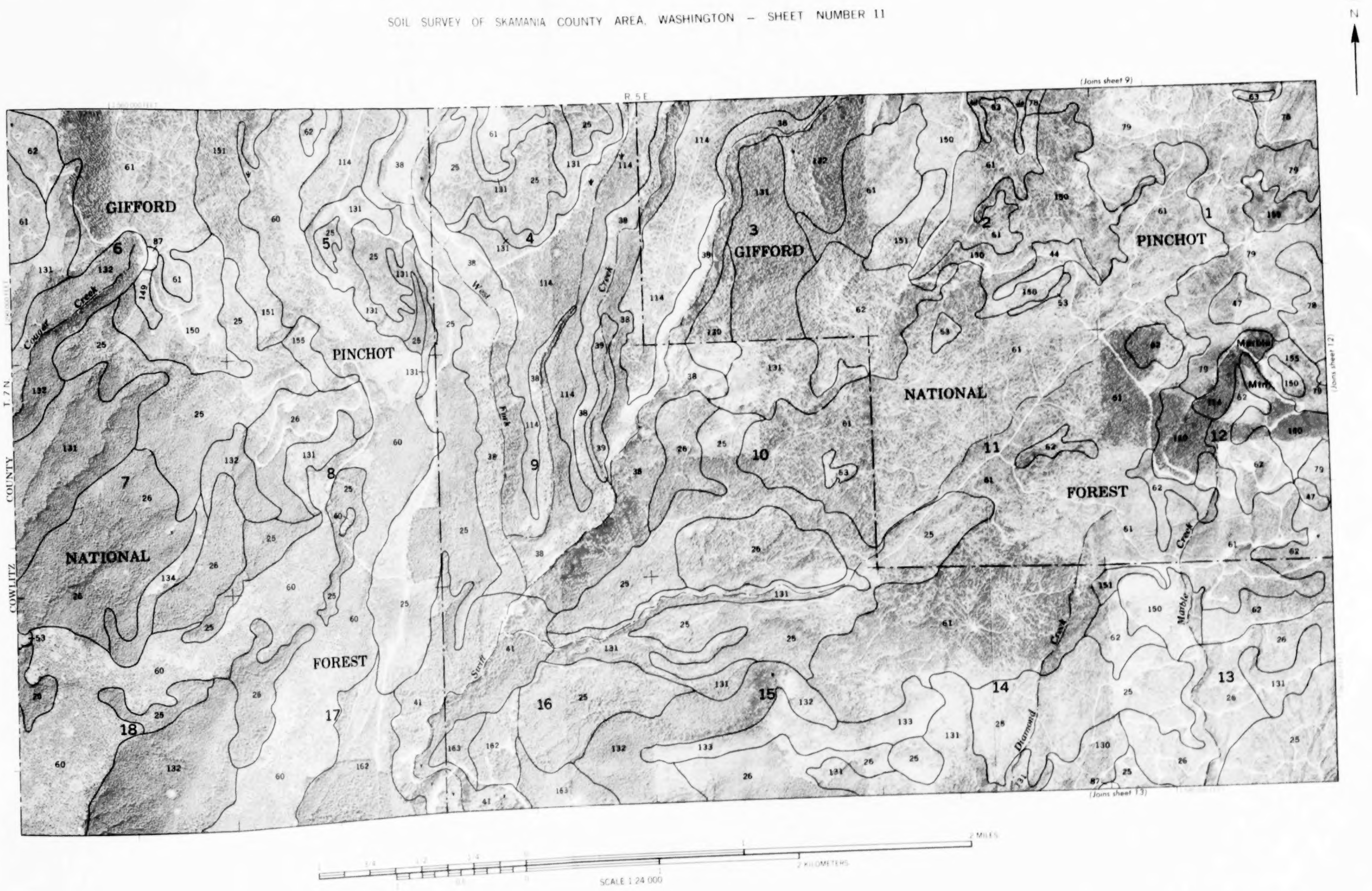
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 10A


(Joins sheet 8A)
R. 6 E.
(Joins sheet 9A)
T. 8 N.
ST. HELENS
VOLCANIC
NATIONAL
MONUMENT
GIFFORD
PINCHOT
NATIONAL
FOREST
Muddy
River
Creek
River
LIMIT OF SOIL SURVEY
19
20
21
26
27
28
29
30
31
32
33
34
35
230
89
92
88
114
266
12
13
14
61
62
90
40
2 MILES
2 KILOMETERS
SCALE 1:24 000

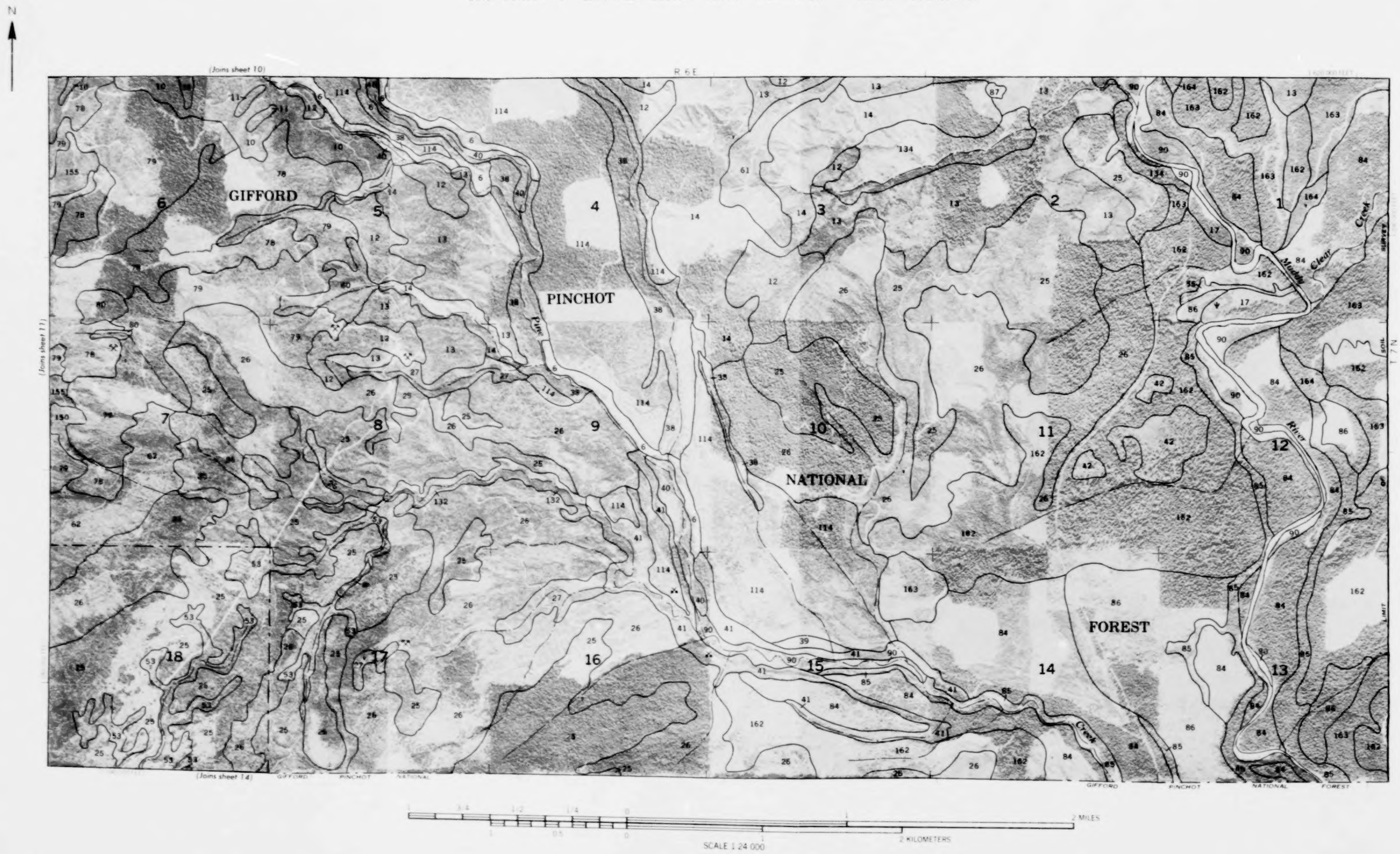
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 10


N
(Joins sheet 8)
R. 6 E.
(Joins sheet 9)
(Joins sheet 12)
T. 8 N.
GIFFORD
PINCHOT
NATIONAL
FOREST
LIMIT
SURVEY
Muddy River
Creek
19
20
21
25
26
27
28
29
30
31
32
33
34
35
36
SCALE 1:24 000
2 MILES
2 KILOMETERS

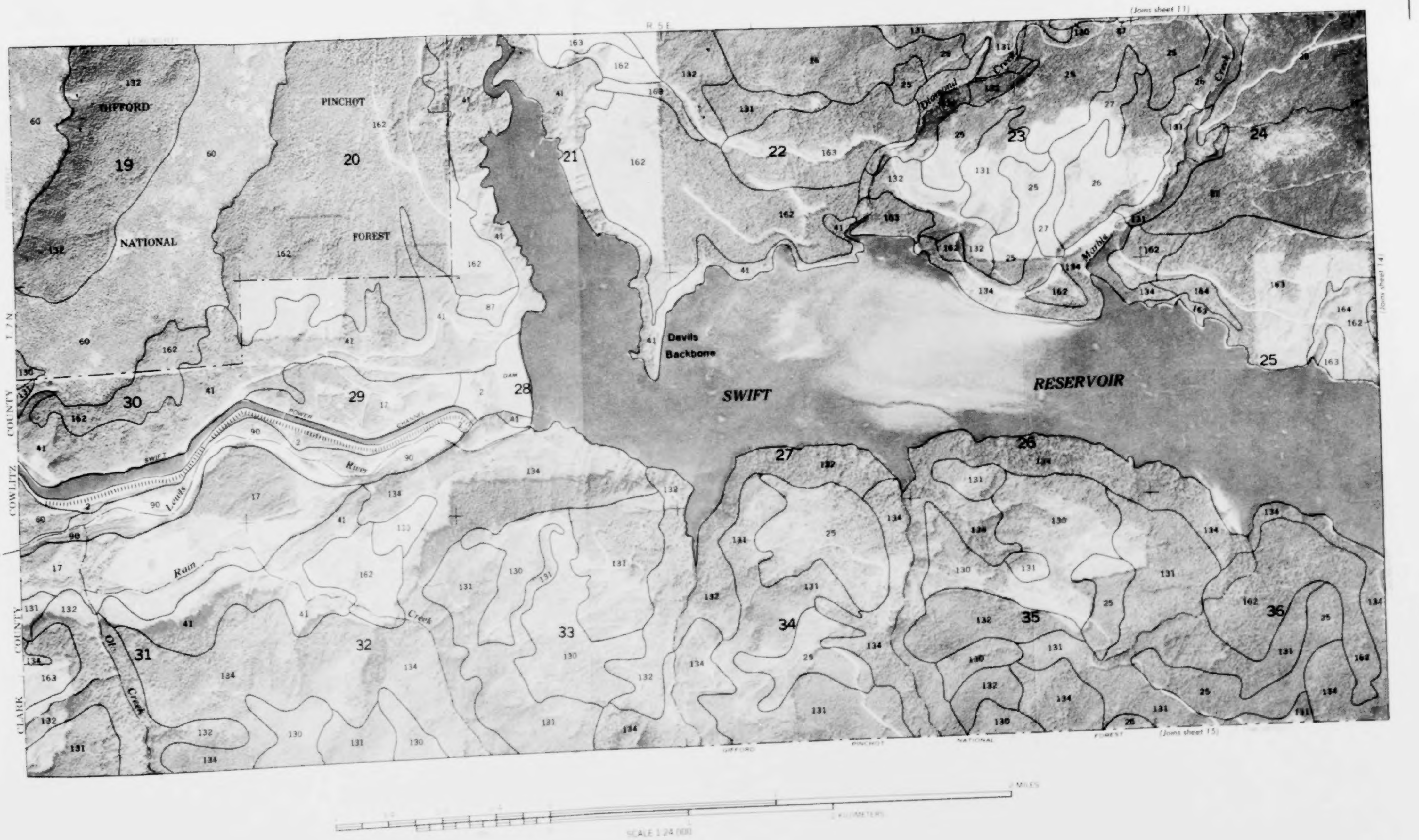
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 11


N
(Joins sheet 9)
R. 5 E.
T. 7 N.
COWLITZ COUNTY
GIFFORD
PINCHOT
NATIONAL
FOREST
Cougar Creek
West Fork Creek
Swift
Marble Mtn.
Marble Creek
Diamond Creek
(Joins sheet 12)
(Joins sheet 13)
2 MILES
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 12


N
(Joins sheet 10)
R 6 E
(Joins sheet 11)
T 7 N
GIFFORD
PINCHOT
NATIONAL
FOREST
Pine
Muddy
Clear
Creek
River
Creek
SOIL SURVEY LIMIT
(Joins sheet 14)
GIFFORD PINCHOT NATIONAL
GIFFORD PINCHOT NATIONAL FOREST
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 13


N
(Joins sheet 11)
R. 5 E.
T. 7 N.
GIFFORD
PINCHOT
NATIONAL
FOREST
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
Devils Backbone
SWIFT
RESERVOIR
Diamond Creek
Marble Creek
DAM
SWIFT POWER CHANNEL
Lewis River
Rain Creek
Ole Creek
COWLITZ COUNTY
CLARK COUNTY
(Joins sheet 14)
GIFFORD PINCHOT NATIONAL FOREST
(Joins sheet 15)
2 MILES
2 KILOMETERS
SCALE 1:24 000

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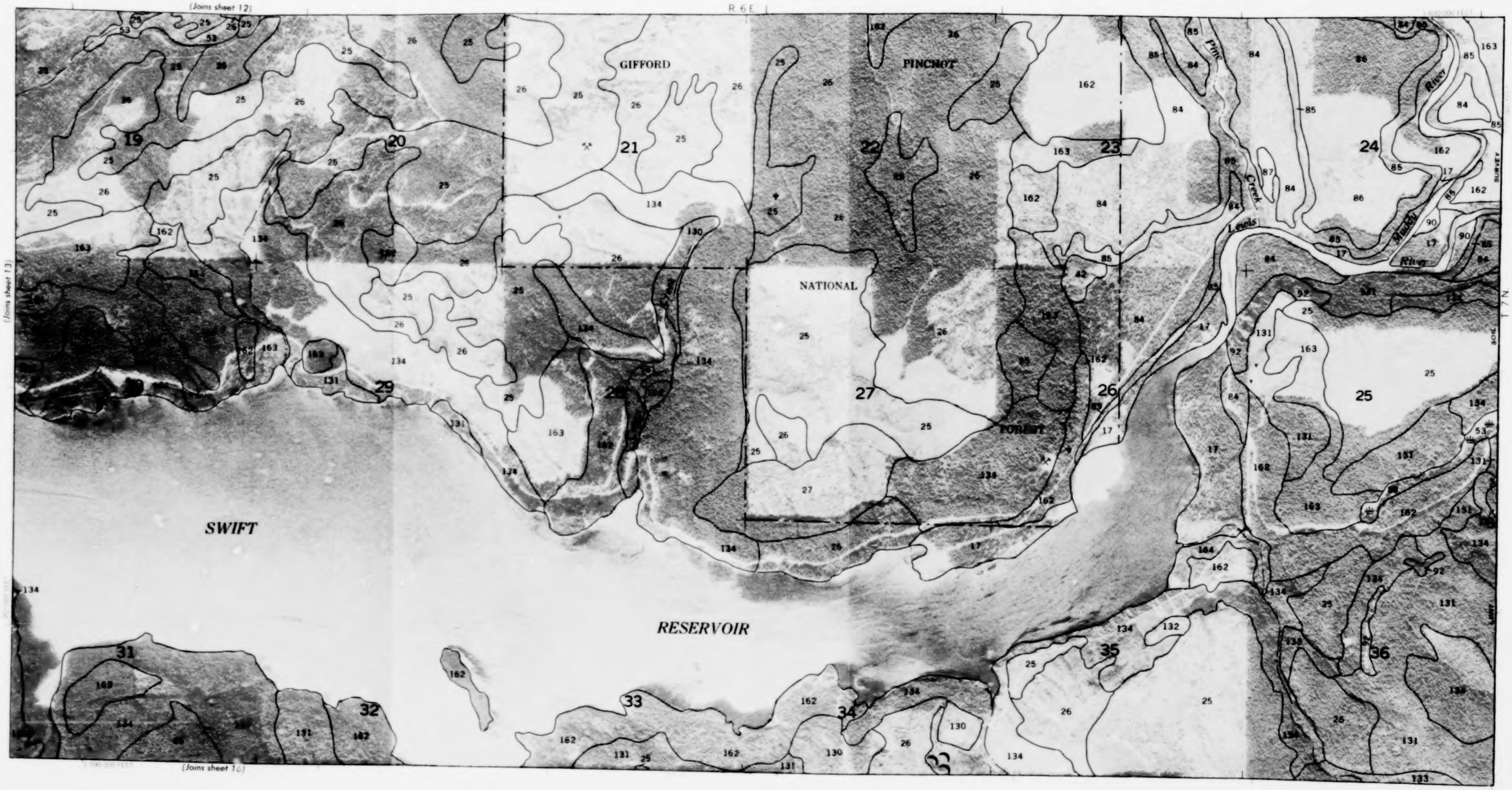
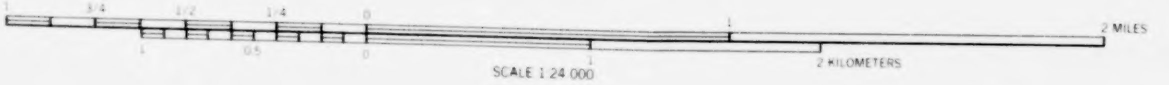
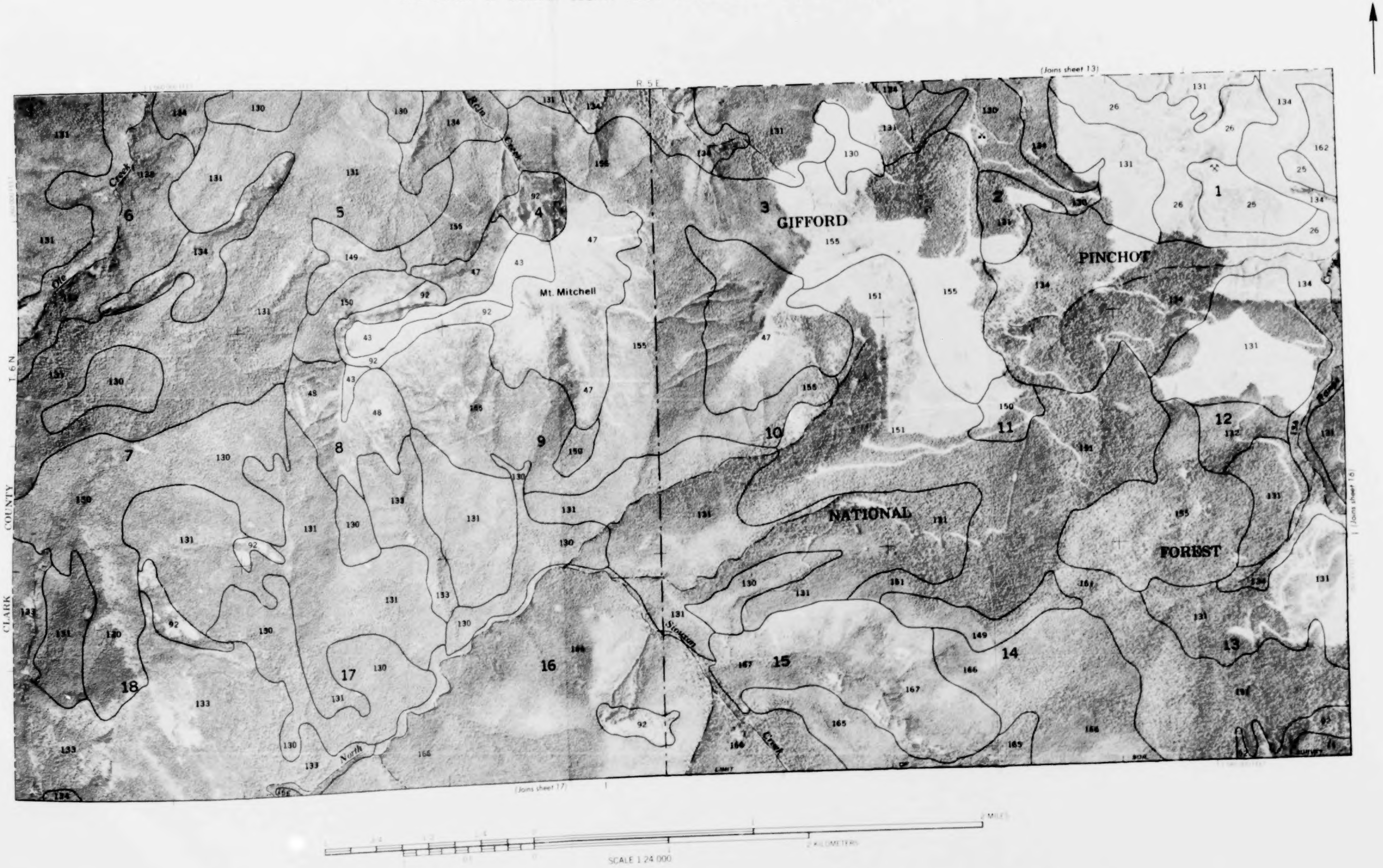
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 14


(Joins sheet 12)
(Joins sheet 13)
(Joins sheet 16)
R 6 E
T 7 N
GIFFORD
PINCHOT
NATIONAL
FOREST
SWIFT
RESERVOIR
Lewis
River
Pine Creek
Muddy River
19
20
21
22
23
24
26
27
28
29
31
32
33
34
35
36


1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 15


N
(Joins sheet 13)
R. 5 E.
T. 6 N.
CLARK COUNTY
GIFFORD
PINCHOT
NATIONAL
FOREST
Mt. Mitchell
Rain Creek
Ole Creek
Siouxon Creek
North
(Joins sheet 16)
(Joins sheet 17)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
25
26
43
47
48
92
130
131
133
134
149
150
151
155
162
165
166
167
2 MILES
2 KILOMETERS
SCALE 1:24 000

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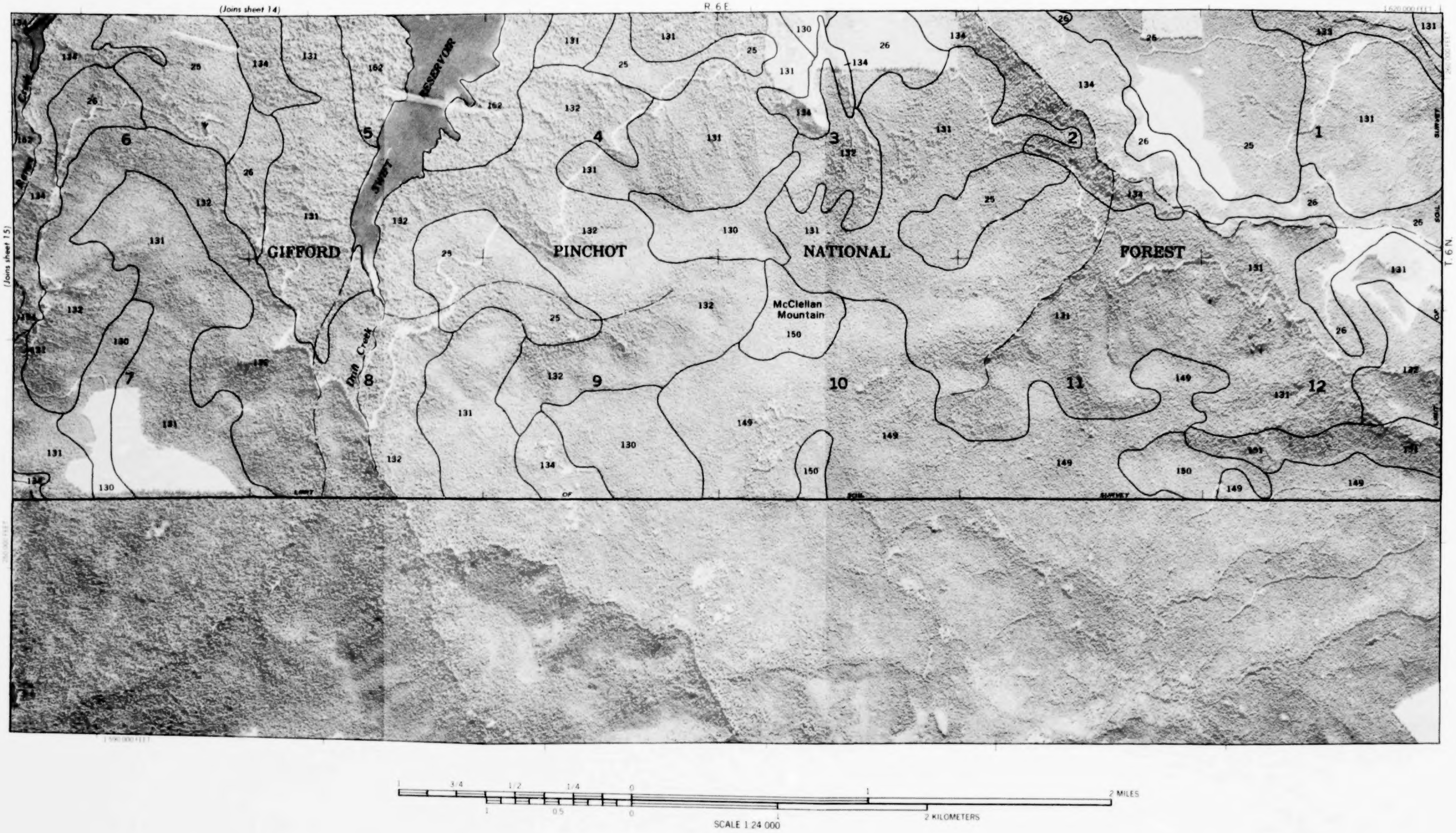
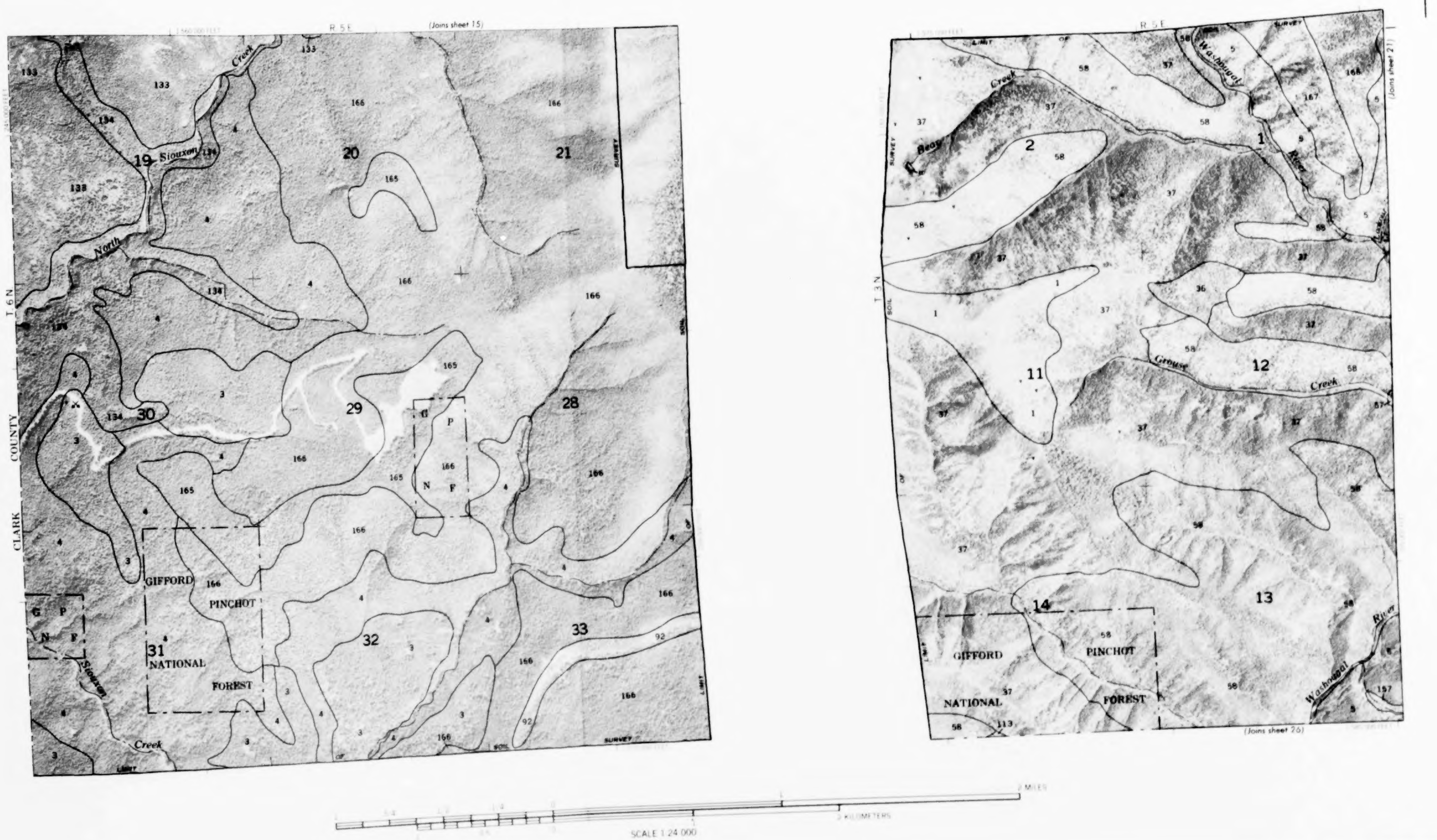
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 16


(Joins sheet 14)
R. 6 E.
1 620 000 FEET
(Joins sheet 15)
T. 6 N.
GIFFORD
PINCHOT
NATIONAL
FOREST
SWIFT
RESERVOIR
Drift Creek
McClellan Mountain
LIMIT OF SOIL SURVEY
1 590 000 FEET
1
2
3
4
5
6
7
8
9
10
11
12
25
26
130
131
132
134
149
150
162
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS

SCALE 1:24 000


N
(Joins sheet 15)
R. 5 E.
T. 6 N.
CLARK COUNTY
Siouxon Creek
North
GIFFORD PINCHOT NATIONAL FOREST
G P N F
SOIL SURVEY LIMIT
19
20
21
28
29
30
31
32
33
133
134
166
165
4
3
92
R. 5 E.
T. 3 N.
(Joins sheet 21)
(Joins sheet 26)
Washougal River
Bear Creek
Grouse Creek
1
2
11
12
13
14
37
58
36
5
167
157
113
2 MILES
3 KILOMETERS
SCALE 1:24 000

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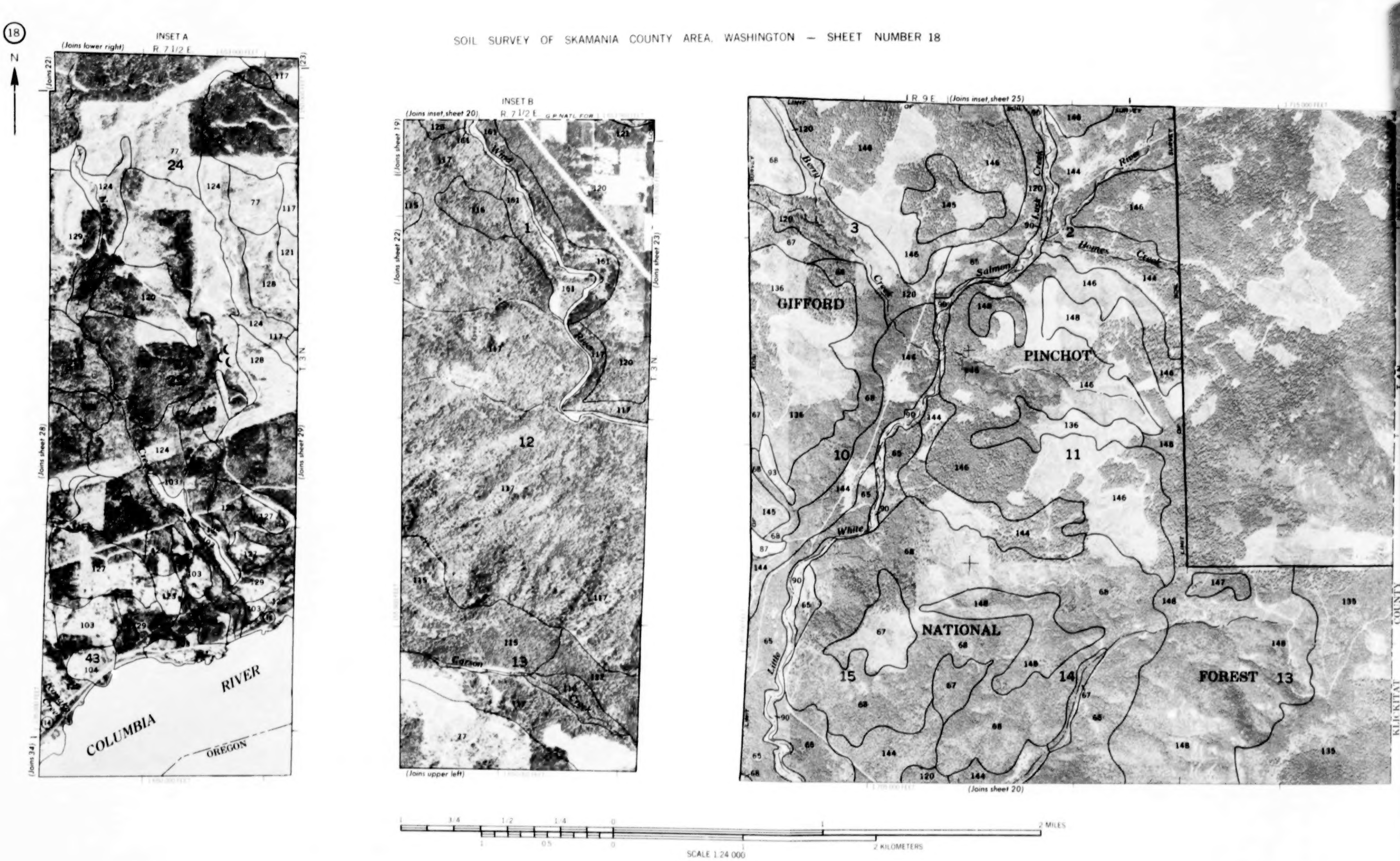
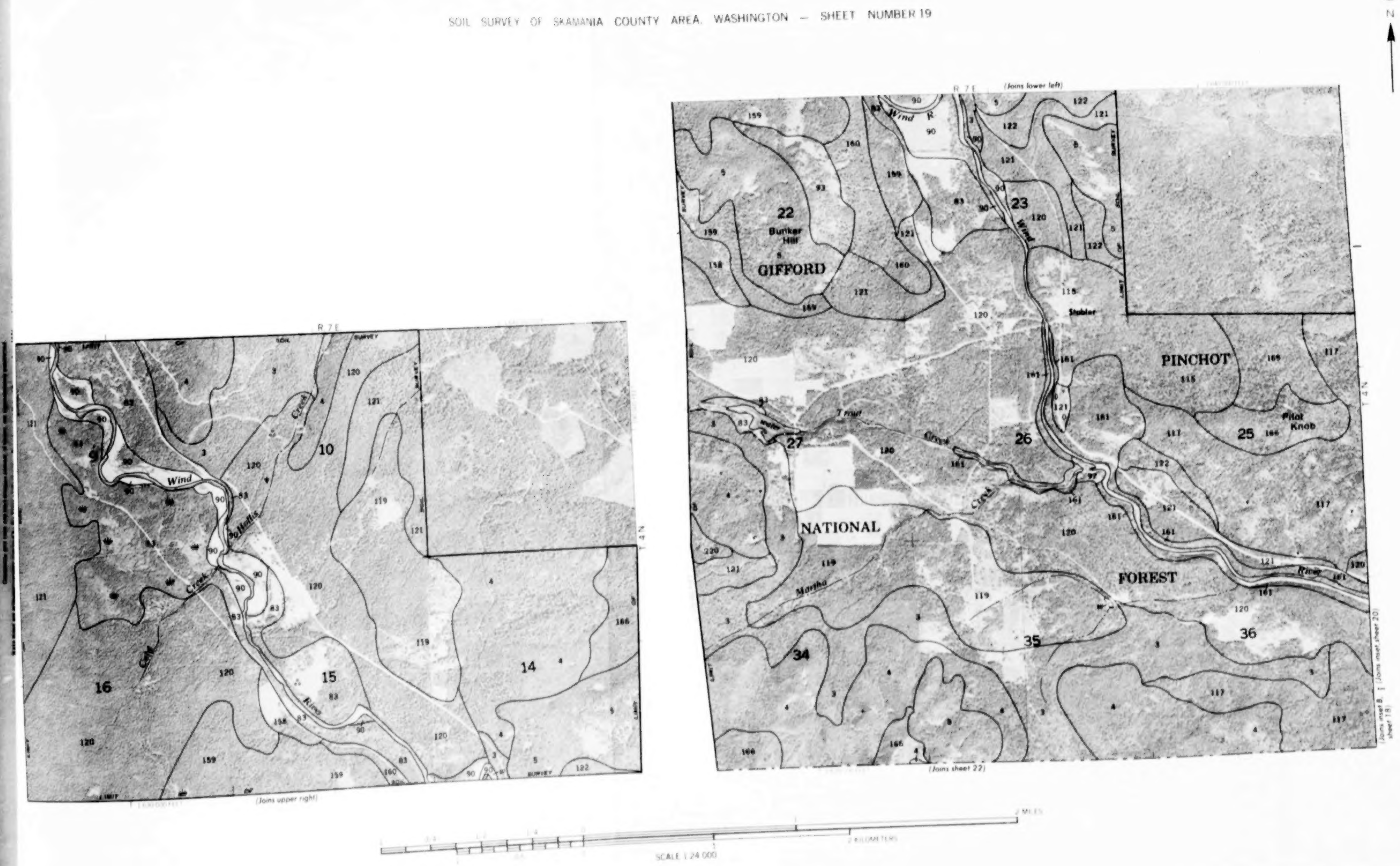
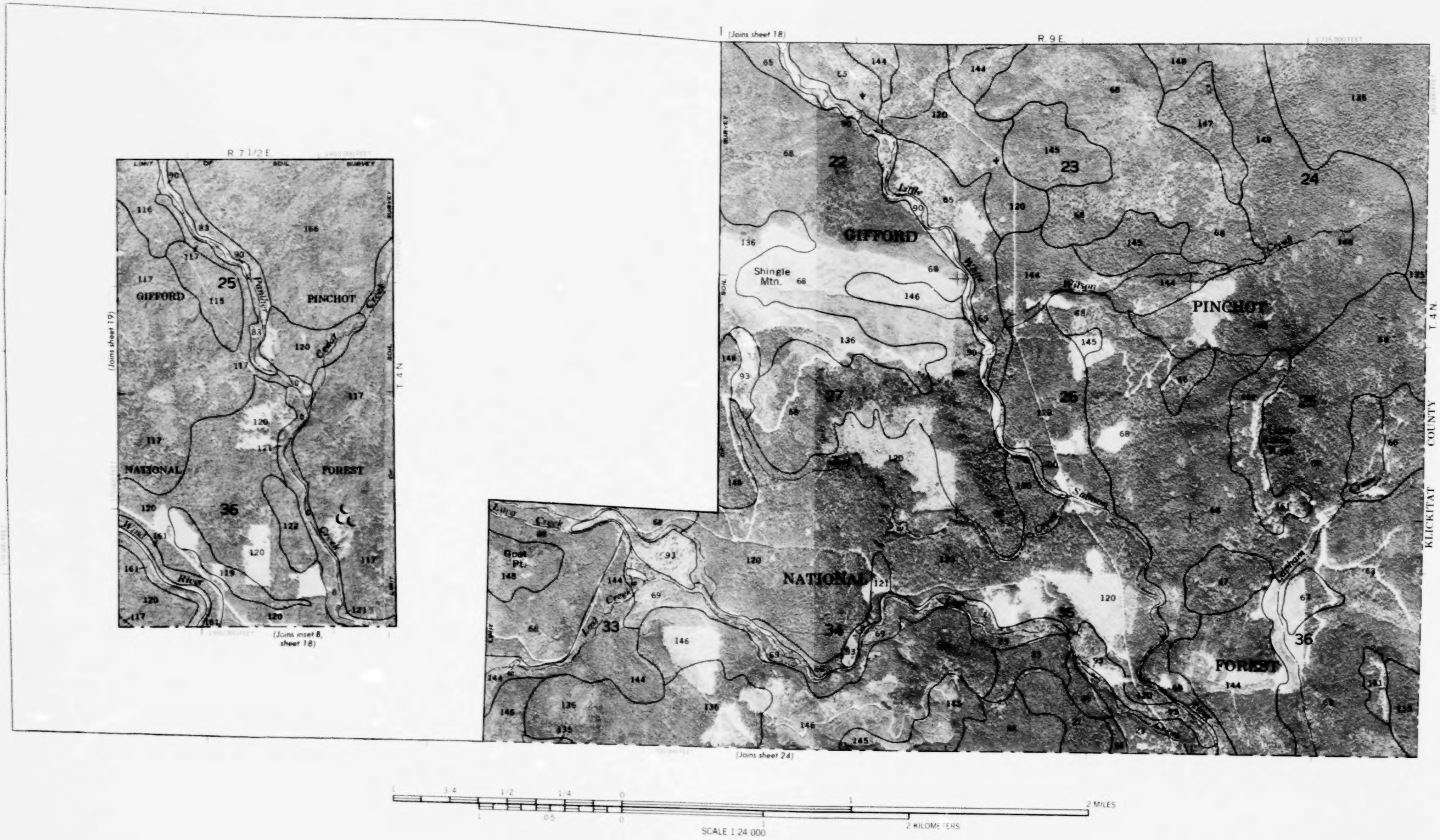
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 18

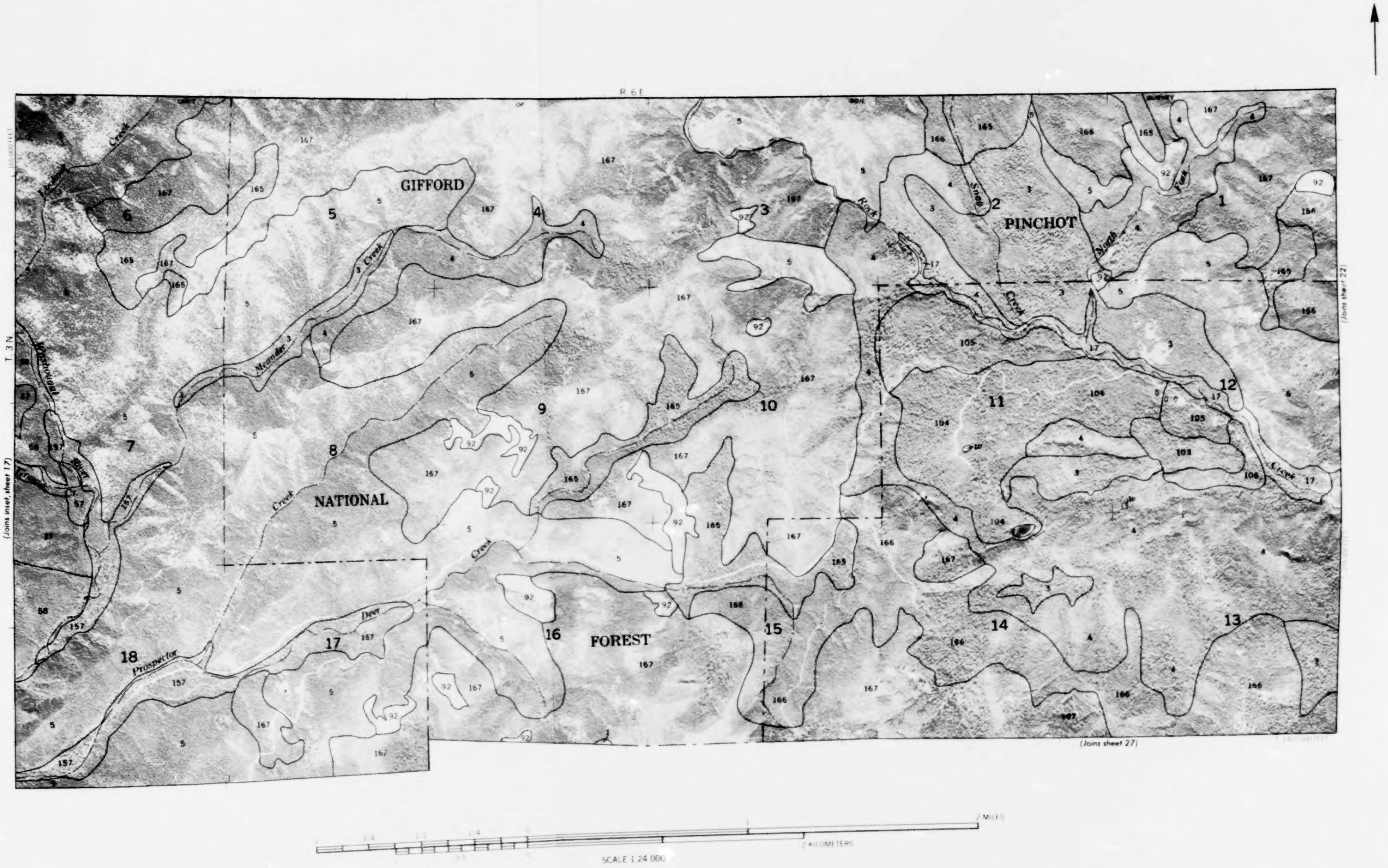

N
INSET A
(Joins lower right)
R. 7 1/2 E.
(Joins 22)
(23)
(Joins sheet 28)
(Joins sheet 29)
(Joins 34)
T. 3 N.
COLUMBIA
RIVER
OREGON
INSET B
(Joins inset, sheet 20)
R. 7 1/2 E.
G.P. NATL. FOR.
(Joins sheet 19)
(Joins sheet 22)
(Joins sheet 23)
(Joins upper left)
White
Carson
Creek
R. 9 E.
(Joins inset, sheet 25)
(Joins sheet 20)
GIFFORD
PINCHOT
NATIONAL
FOREST
KLICKITAT
COUNTY
T. 4 N.
Salmon
Berry
Creek
Little
White
Lost
Creek
Ward
Creek
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


N
R. 7 E.
(Joins lower left)
T. 4 N.
22
Bunker Hill
GIFFORD
PINCHOT
NATIONAL
FOREST
23
25
26
27
34
35
36
Pilot Knob
Stabler
Wind R.
Wind River
Trout Creek
Martha Creek
(Joins sheet 22)
(Joins inset B, sheet 18)
(Joins sheet 20)
9
10
14
15
16
Wind
Paradise Creek
Hollis Creek
Creek
(Joins upper right)
SOIL SURVEY LIMIT
2 MILES
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 20


N
(Joins sheet 18)
R. 9 E.
R. 7 1/2 E.
LIMIT OF SOIL SURVEY
(Joins sheet 19)
T. 4 N.
GIFFORD
PINCHOT
NATIONAL
FOREST
Little White Salmon
Cedar Creek
Panther
Wind River
Shingle Mtn.
Wilson
Lusk Creek
Goat Pt.
Lost Creek
KLICKITAT COUNTY
(Joins inset B, sheet 18)
(Joins sheet 24)
22
23
24
25
26
27
33
34
35
36
SCALE 1:24 000
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 21


N
R. 6 E.
T. 3 N.
GIFFORD
PINCHOT
NATIONAL
FOREST
Meander Creek
Creek
Rock Creek
Snag Creek
Slough
Deer
Prospector
Creek
(Joins inset, sheet 17)
(Joins sheet 22)
(Joins sheet 27)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
5
92
165
166
167
3
4
17
57
58
104
105
106
157
2 MILES
2 KILOMETERS
SCALE 1:24 000

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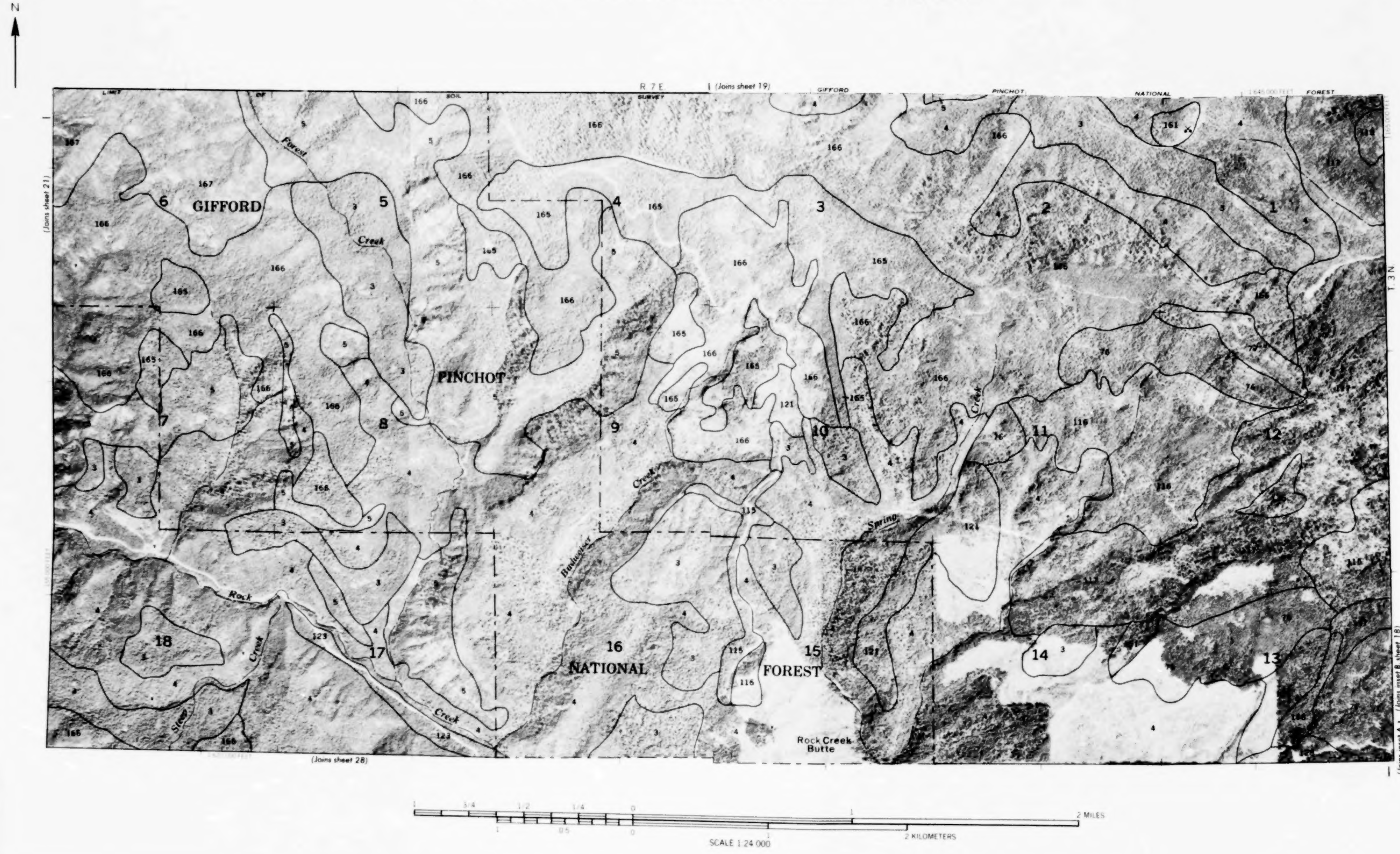
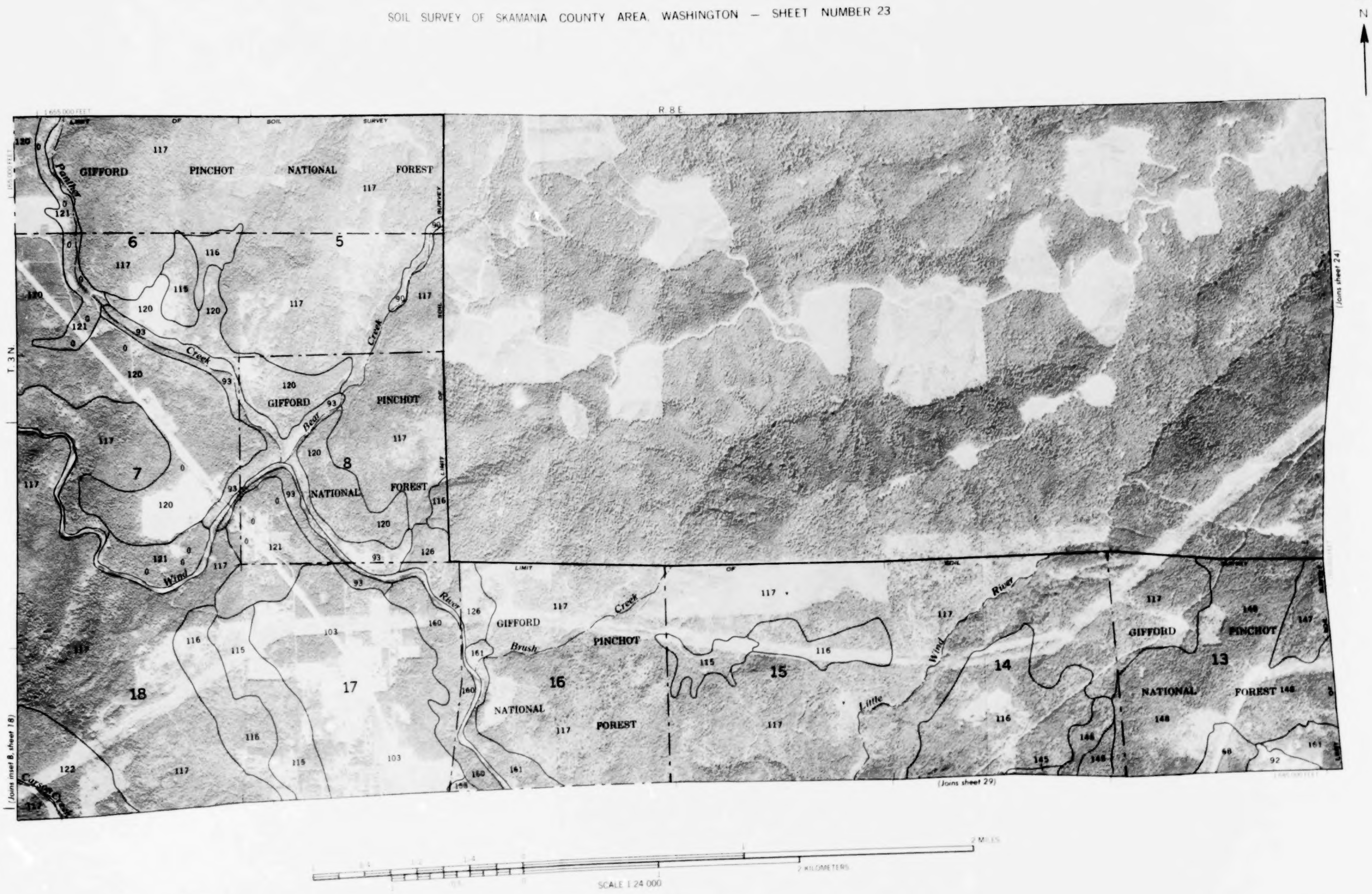
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 22


N
R. 7 E.
(Joins sheet 19)
LIMIT OF SOIL SURVEY
GIFFORD PINCHOT NATIONAL FOREST
1 640 000 FEET
(Joins sheet 21)
T. 3 N.
(Joins sheet 28)
(Joins inset A, sheet 18)
(Joins inset B, sheet 18)
GIFFORD
PINCHOT
NATIONAL
FOREST
Forest
Creek
Rock Creek
Steep Creek
Budweiser Creek
Spring Creek
Rock Creek Butte
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
3
4
5
76
115
116
121
123
161
165
166
167
SCALE 1:24 000
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 23


N
R. 8 E.
T. 3 N.
LIMIT OF SOIL SURVEY
GIFFORD PINCHOT NATIONAL FOREST
Panther Creek
Bear Creek
Wind River
Brush Creek
Little Wind River
Carson Creek
6
5
7
8
18
17
16
15
14
13
117
120
121
116
115
93
90
126
103
160
161
122
145
146
147
148
92
(Joins sheet 24)
(Joins sheet 29)
(Joins inset B, sheet 18)
2 MILES
2 KILOMETERS
SCALE 1:24 000

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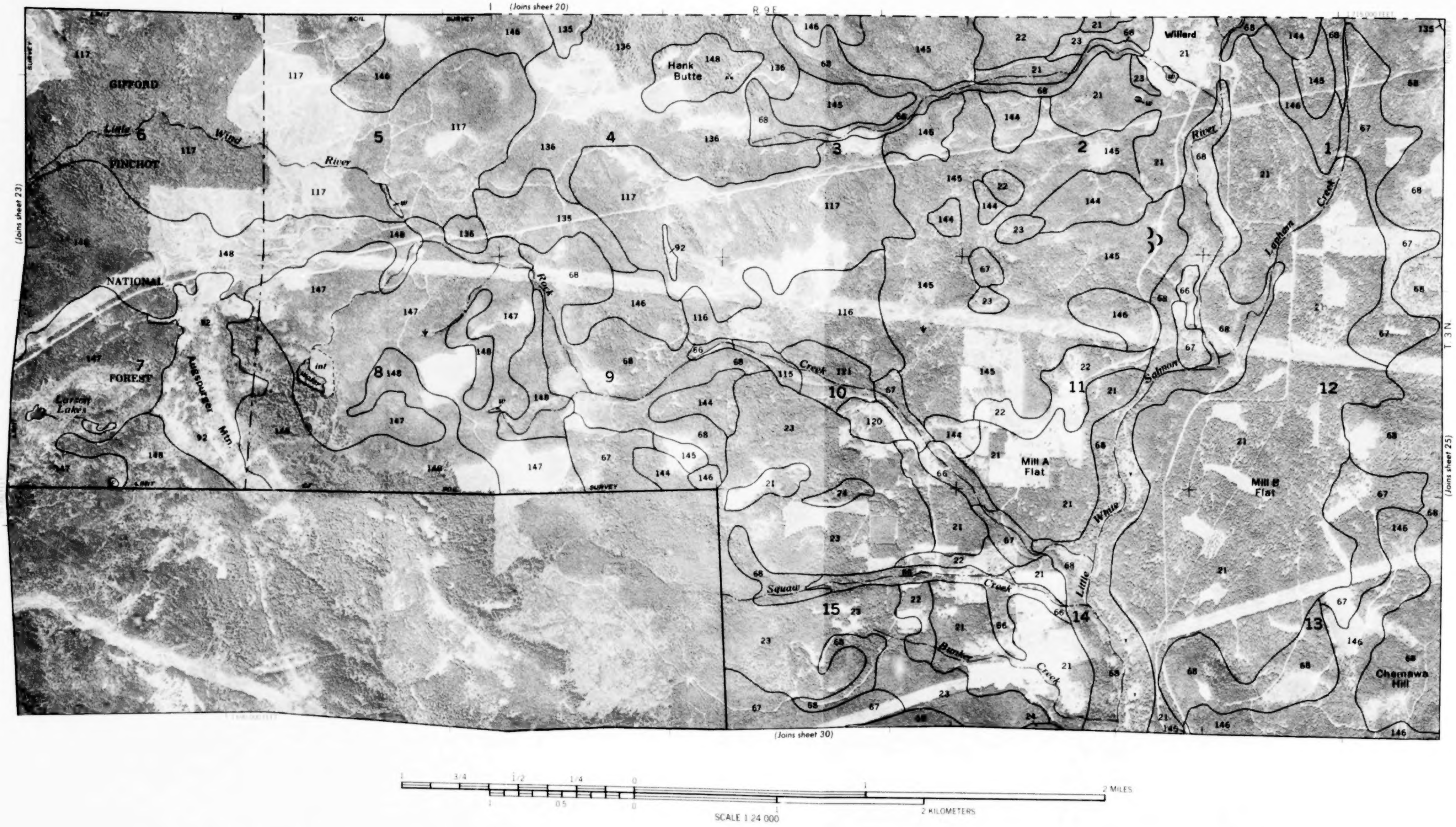
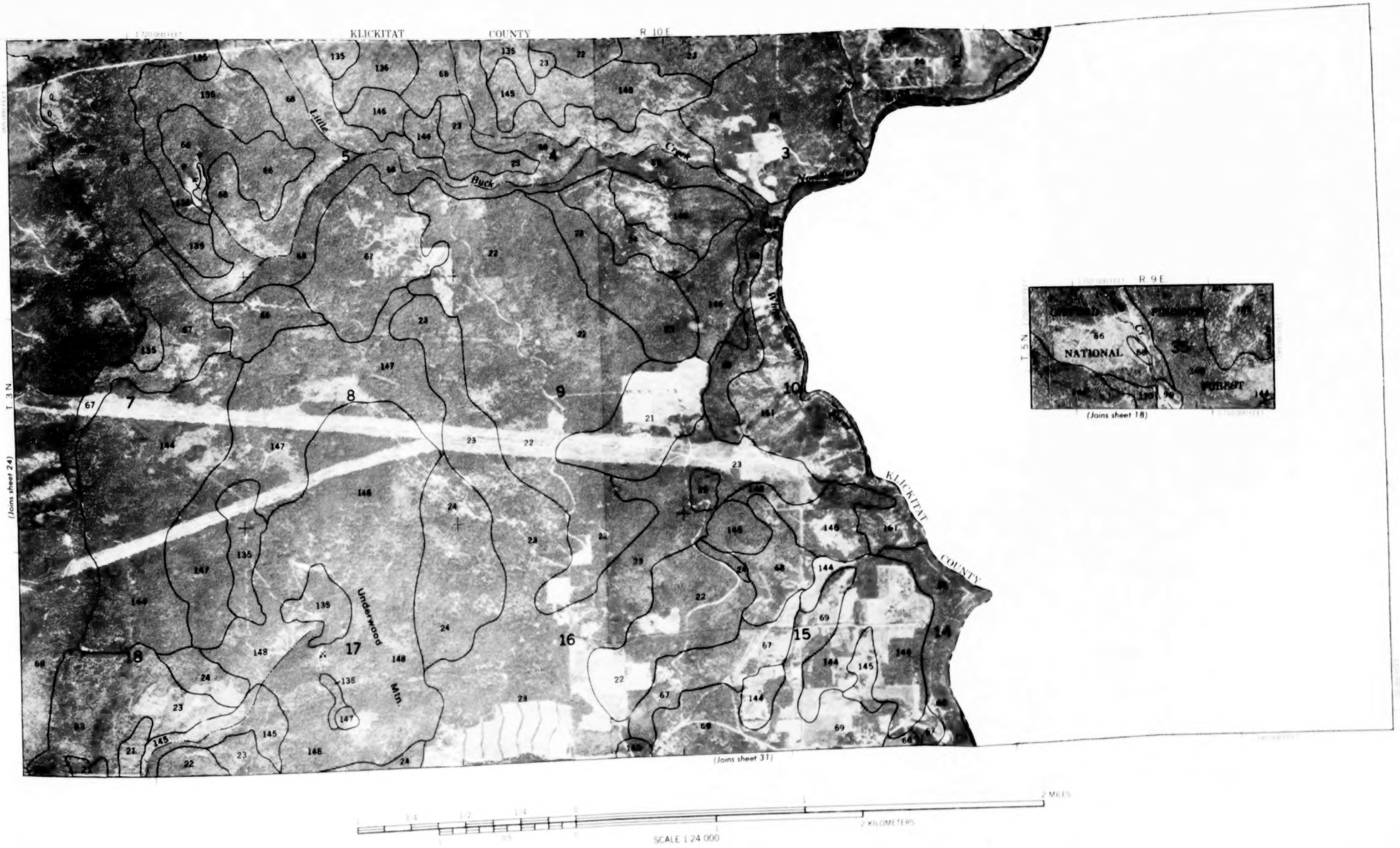
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 24


(Joins sheet 20)
R 9 E
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 30)
T 3 N
GIFFORD
PINCHOT
NATIONAL
FOREST
Little Wind River
Carson Lakes
Augspurger Mtn
Hank Butte
Willard
Rock Creek
Salmon River
Lapham Creek
Little White Salmon River
Squaw Creek
Bunker Creek
Mill A Flat
Mill B Flat
Chemawa Hill
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
21
22
23
24
66
67
68
92
115
116
117
120
121
135
136
144
145
146
147
148
SCALE 1:24 000
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 25

N


KLICKITAT COUNTY
R 10 E
T 3 N
Little Buck Creek
KLICKITAT COUNTY
Underwood Mtn.
(Joins sheet 24)
(Joins sheet 31)
R 9 E
T 5 N
NATIONAL FOREST
(Joins sheet 18)
3
4
5
6
7
8
9
10
14
15
16
17
18
135
136
145
146
147
148
22
23
24
21
67
68
69
2 MILES
2 KILOMETERS
SCALE 1:24 000

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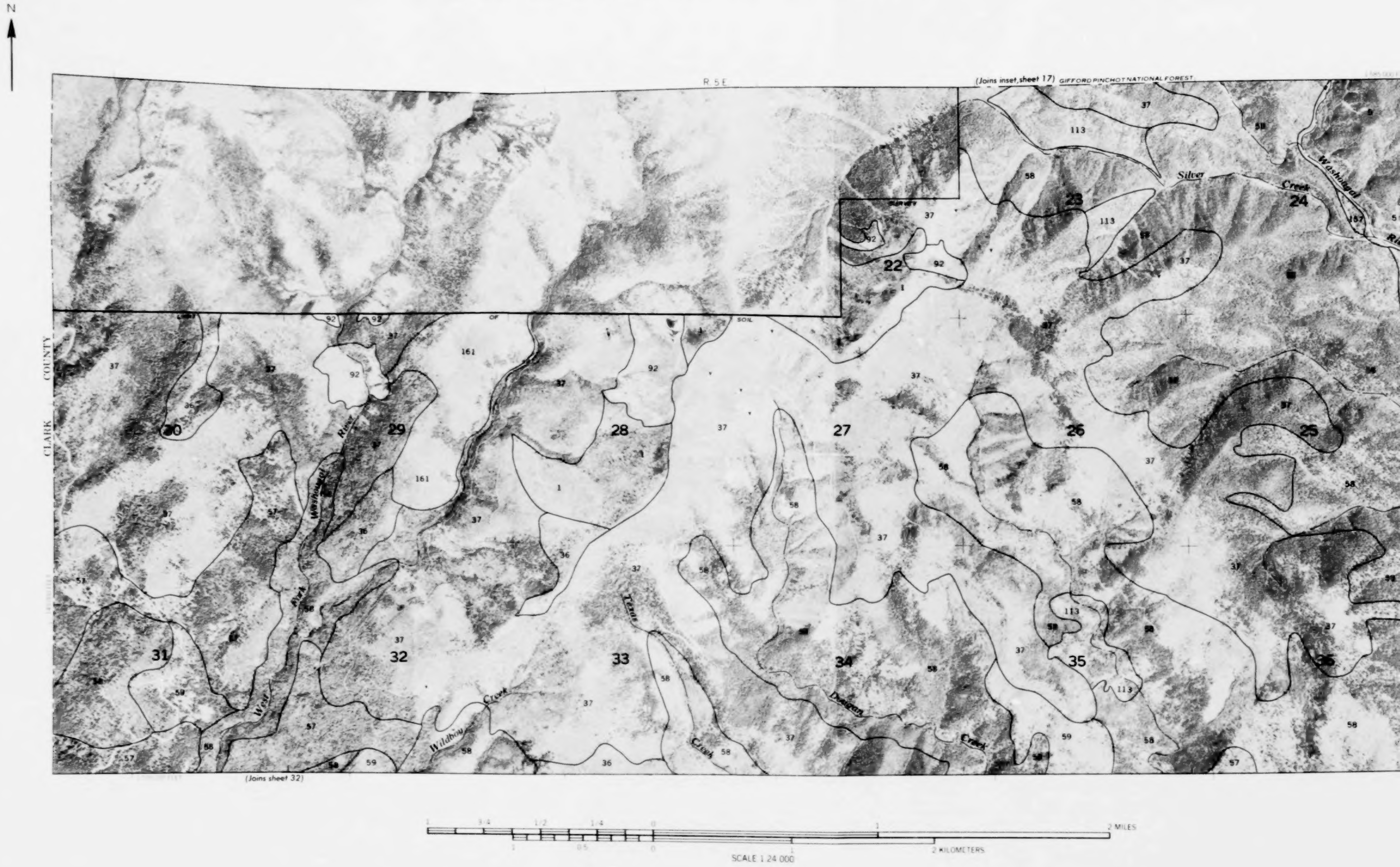
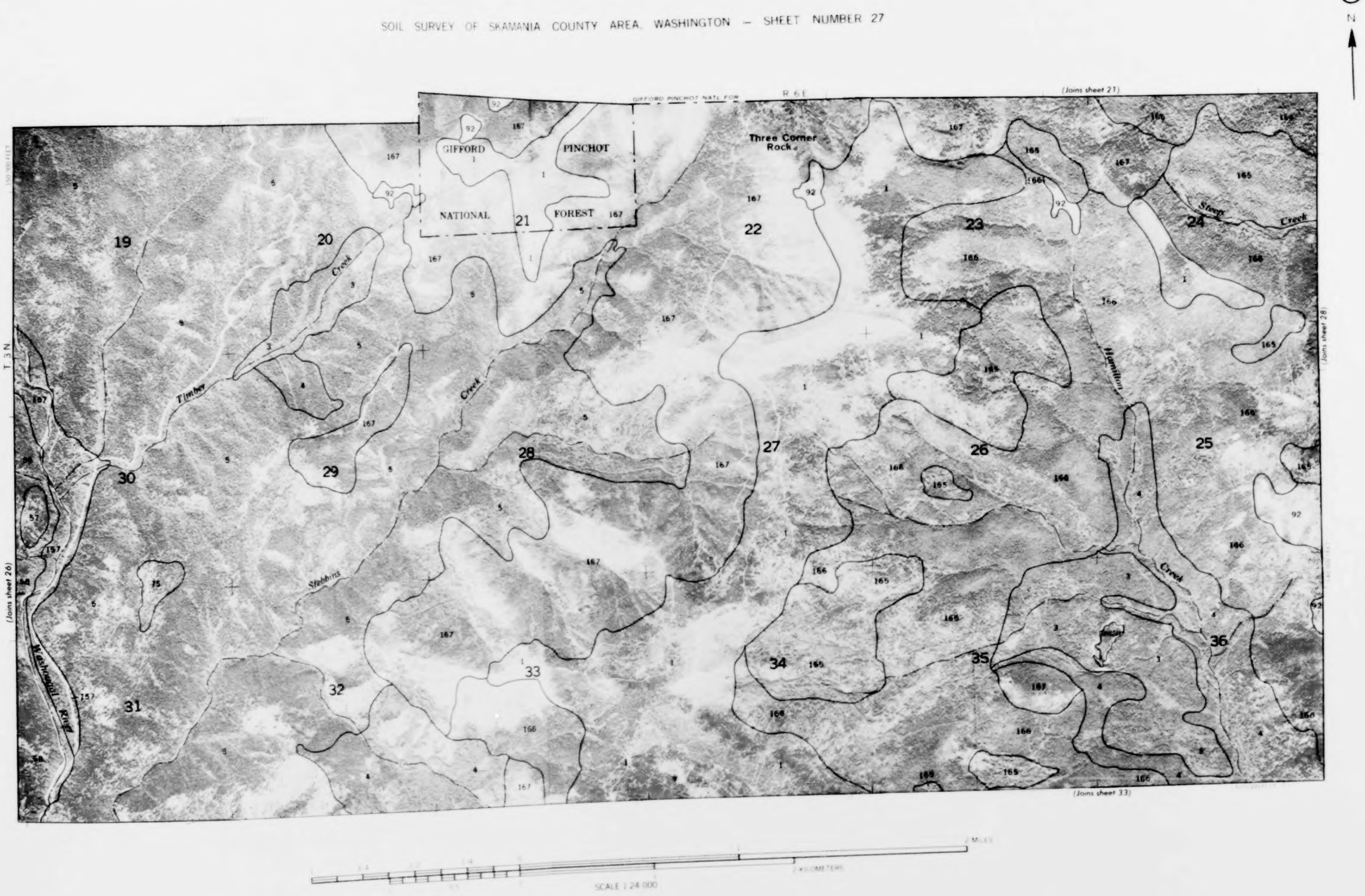
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 26


N
R.5 E.
(Joins inset, sheet 17)
GIFFORD PINCHOT NATIONAL FOREST
CLARK COUNTY
Silver Creek
Washougal River
Wildboy Creek
Dougan Creek
Wolf Creek
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
1
37
58
92
113
161
(Joins sheet 32)
SCALE 1:24 000
2 MILES
2 KILOMETERS

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 27


27
N
GIFFORD PINCHOT NAT'L FOR.
R. 6 E.
(Joins sheet 21)
GIFFORD
PINCHOT
NATIONAL
FOREST
Three Corner Rock
T. 3 N.
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 33)
Timber
Creek
Stebbins
Hamilton
Creek
Washougal River
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
1
3
4
5
57
58
75
92
157
165
166
167
2 MILES
2 KILOMETERS
SCALE 1:24 000

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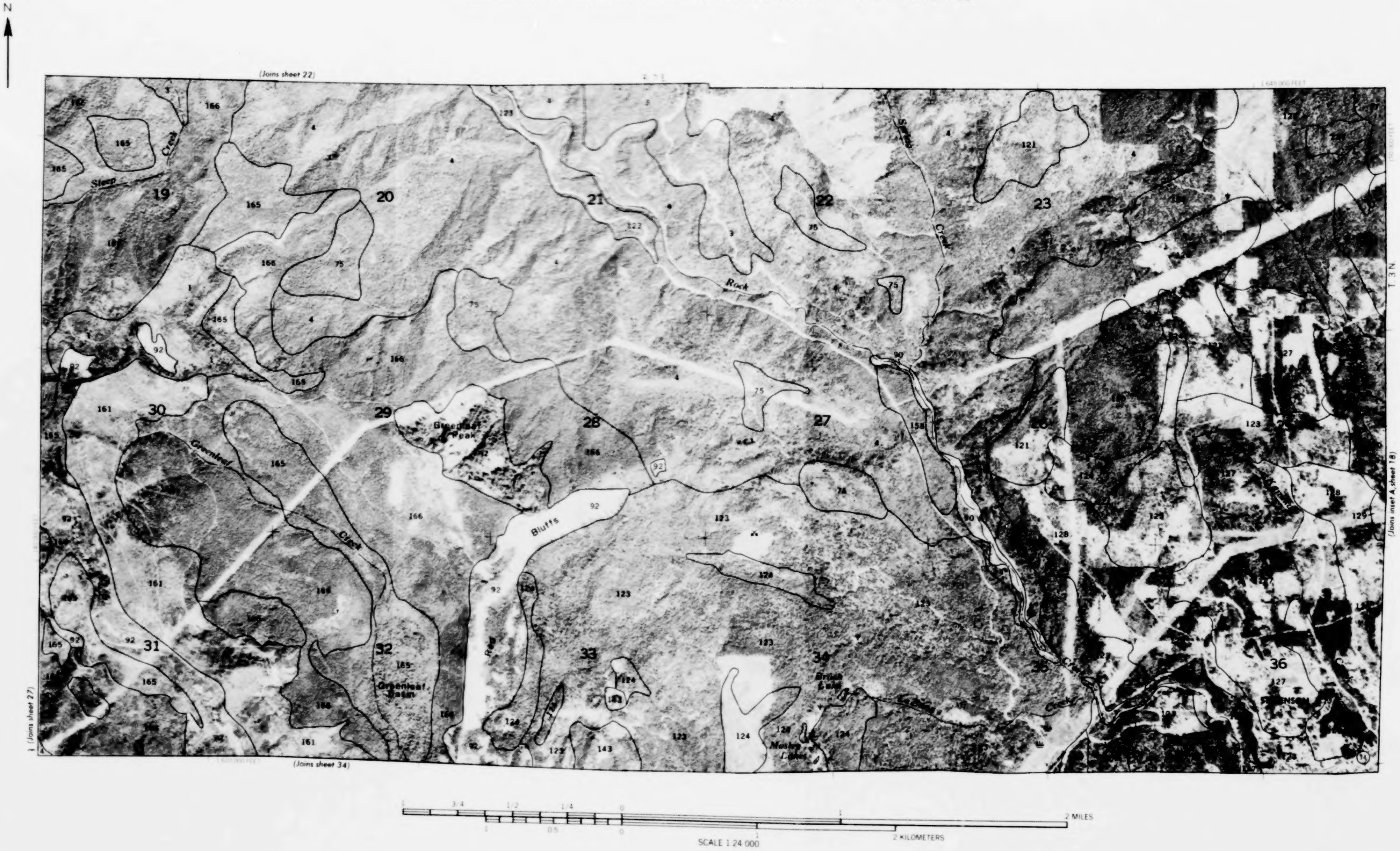
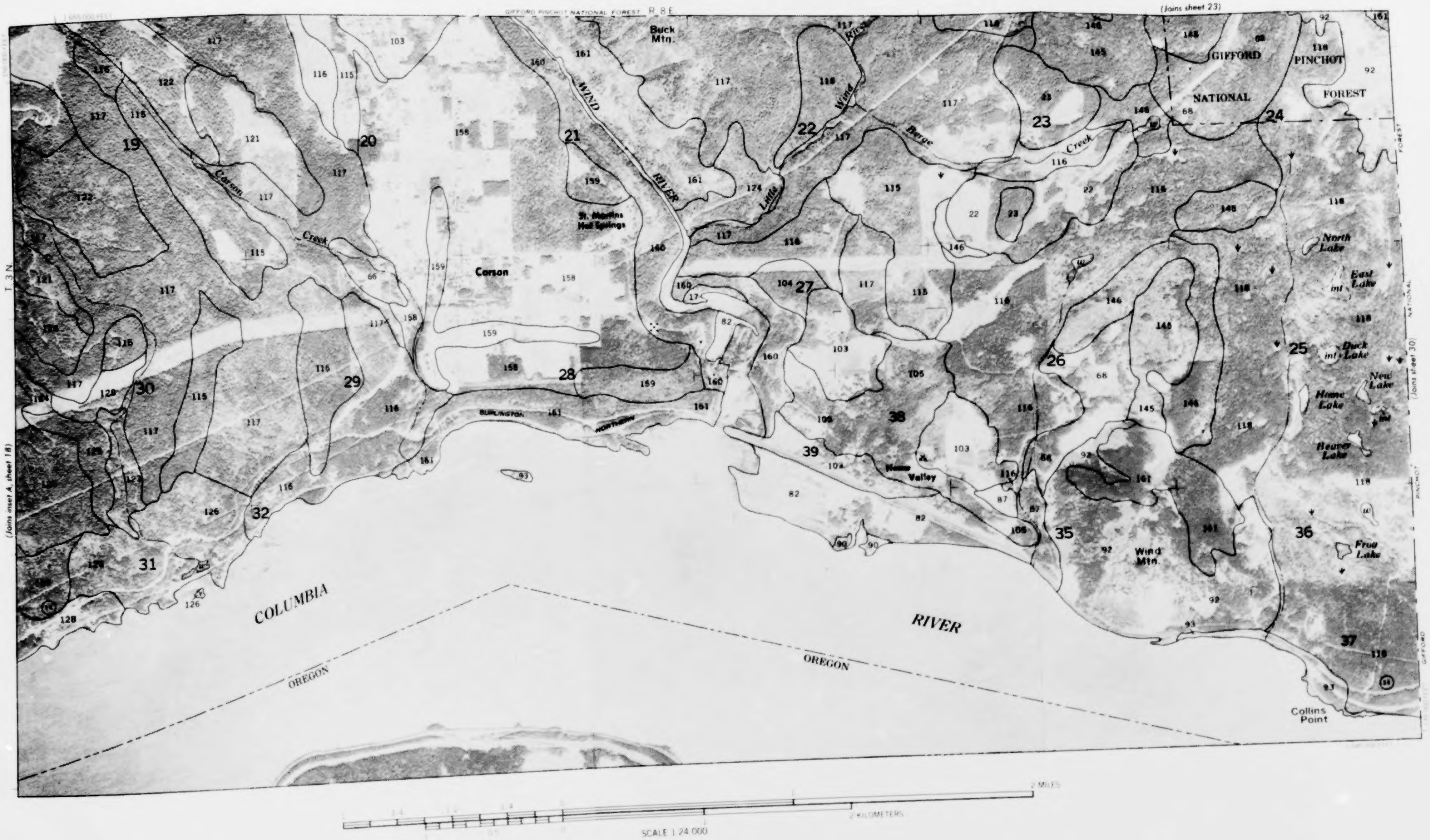
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 28

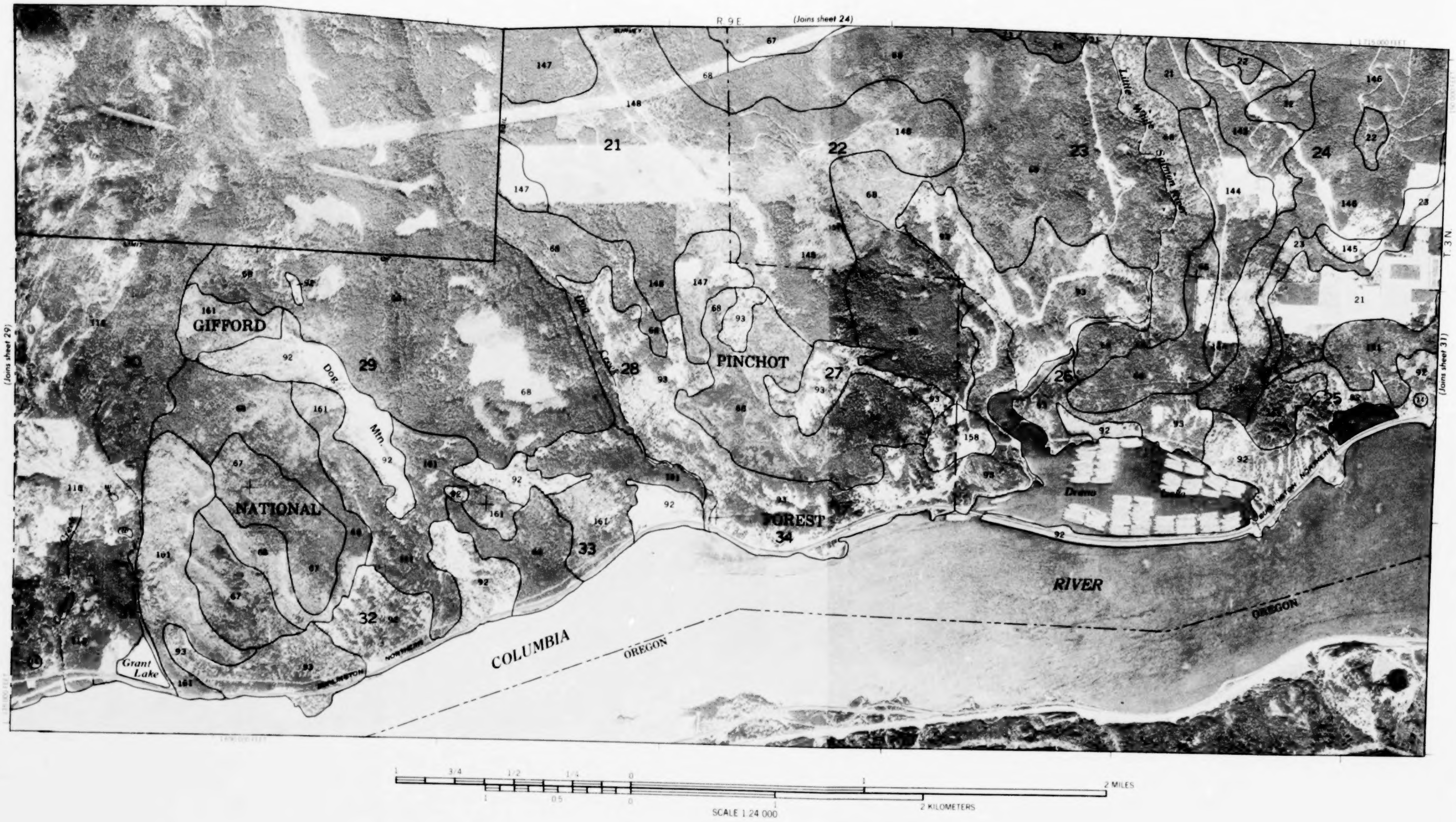

N
(Joins sheet 22)
R. 7 E.
1 645 000 FEET
T. 3 N.
(Joins inset A, sheet 18)
(Joins sheet 27)
(Joins sheet 34)
19
20
21
22
23
30
29
28
27
31
32
33
34
35
36
Sleep Creek
Rock Creek
Greenleaf Creek
Greenleaf Peak
Bluffs
Greenleaf Basin
Bridal Lake
Mosley Lakes
STEVENSON
165
166
161
4
3
75
92
121
122
123
124
127
128
143
158
3/4
1/2
1/4
0
1
0.5
2 MILES
2 KILOMETERS
SCALE 1:24 000

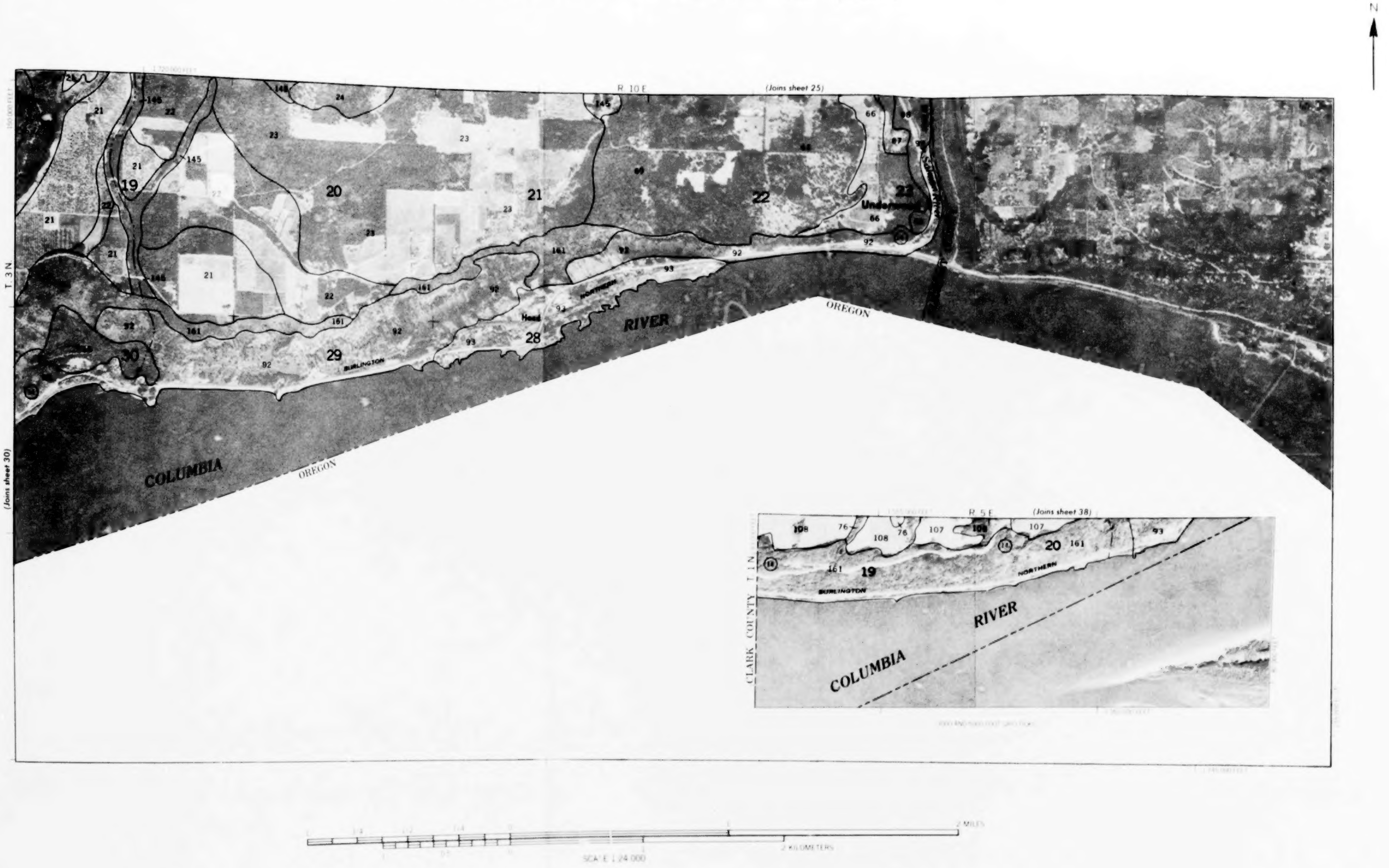
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 29


N
GIFFORD PINCHOT NATIONAL FOREST
R. 8 E.
T. 3 N.
(Joins sheet 23)
(Joins sheet 30)
(Joins inset A, sheet 18)
Buck Mtn.
WIND RIVER
Little Wind River
Carson Creek
Berge Creek
St. Martins Hot Springs
Carson
GIFFORD PINCHOT NATIONAL FOREST
North Lake
East Lake
Duck Lake
New Lake
Home Lake
Beaver Lake
Frog Lake
Home Valley
Wind Mtn.
BURLINGTON NORTHERN
COLUMBIA
RIVER
OREGON
OREGON
Collins Point
2 MILES
2 KILOMETERS
SCALE 1:24 000

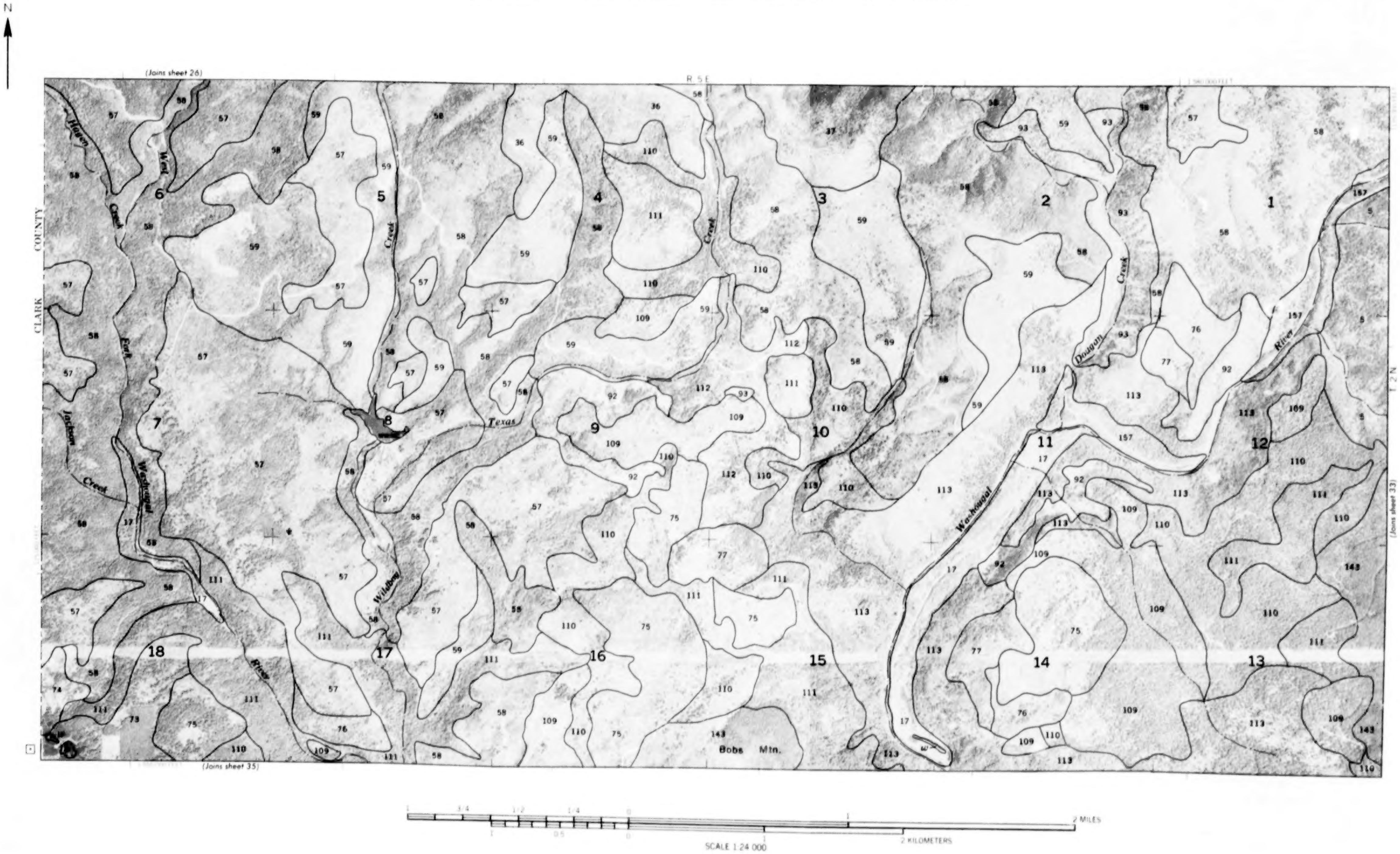
㉚
N

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 30


(Joins sheet 24)
R. 9 E.
T. 3 N.
(Joins sheet 29)
(Joins sheet 31)
GIFFORD
PINCHOT
NATIONAL
FOREST
COLUMBIA
RIVER
OREGON
OREGON
Grant Lake
Dog Mtn.
Little White Salmon River
Drano
21
22
23
24
25
26
27
28
29
30
31
32
33
34
147
148
68
67
144
145
146
161
92
93
116
158
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


N
R. 10 E.
(Joins sheet 25)
T. 3 N.
(Joins sheet 30)
19
20
21
22
23
28
29
30
Underwood
Hood
NORTHERN
BURLINGTON
COLUMBIA
RIVER
OREGON
21
22
23
24
145
148
161
66
87
92
93
R. 5 E.
(Joins sheet 38)
T. 1 N.
CLARK COUNTY
108
76
107
161
19
20
93
NORTHERN
BURLINGTON
RIVER
COLUMBIA
2 MILES
2 KILOMETERS
SCALE 1:24 000

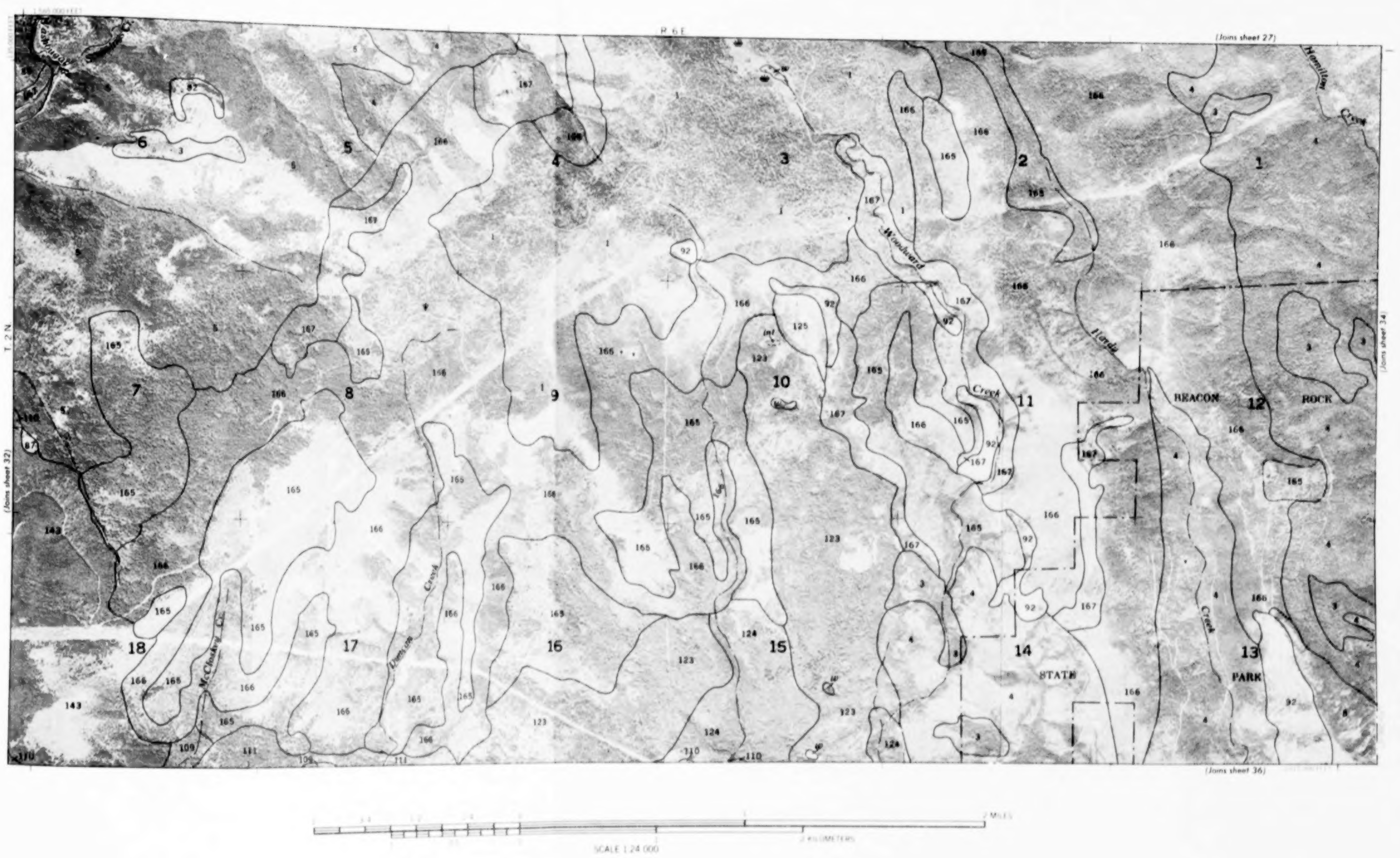
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 32


N
(Joins sheet 26)
R. 5 E.
CLARK COUNTY
T. 2 N.
(Joins sheet 33)
(Joins sheet 35)
Hagen Creek
West Fork
Jackson Creek
Washougal River
Texas
Wildboy Creek
Dougan Creek
Washougal
River
Bobs Mtn.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

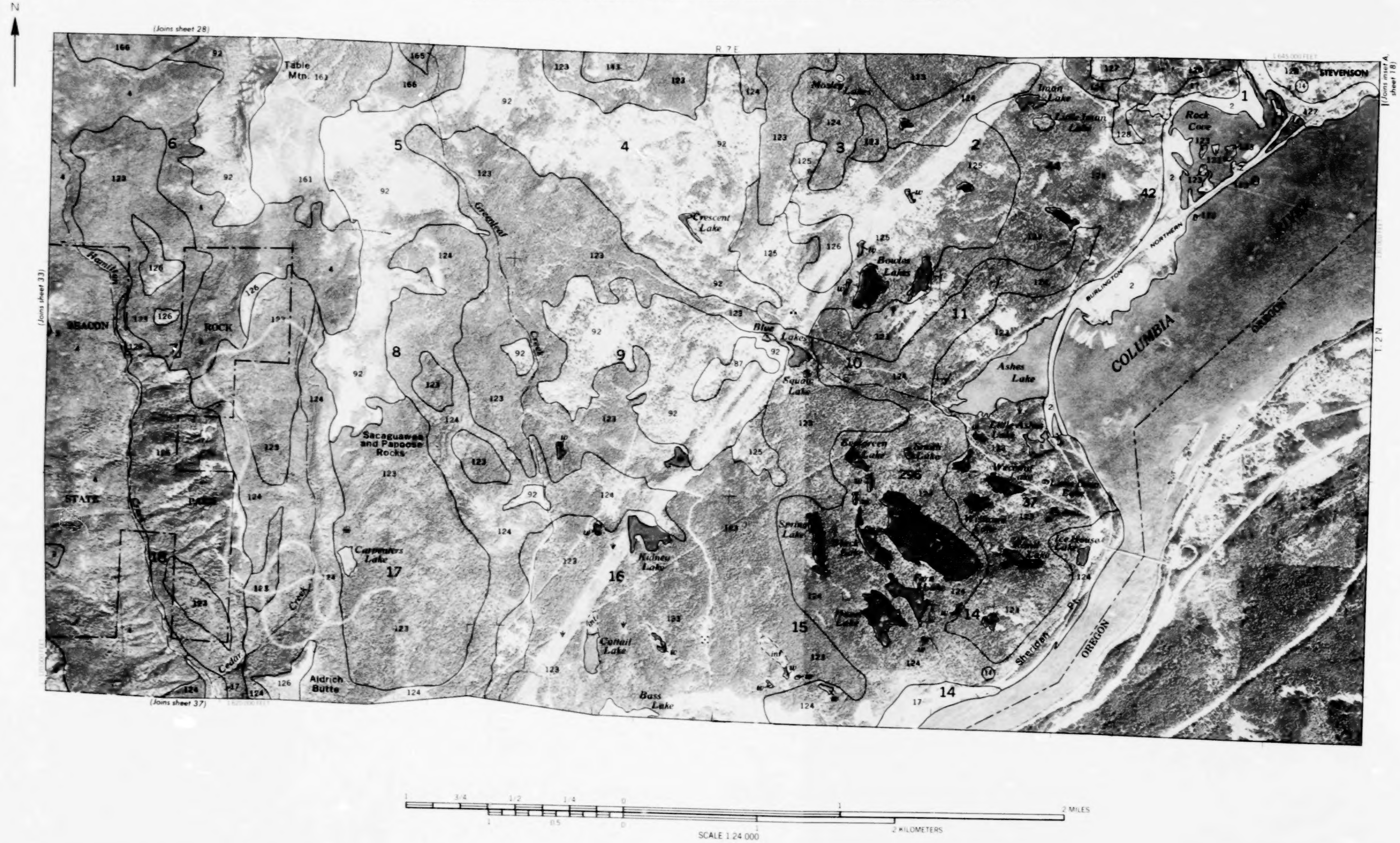
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 33

33

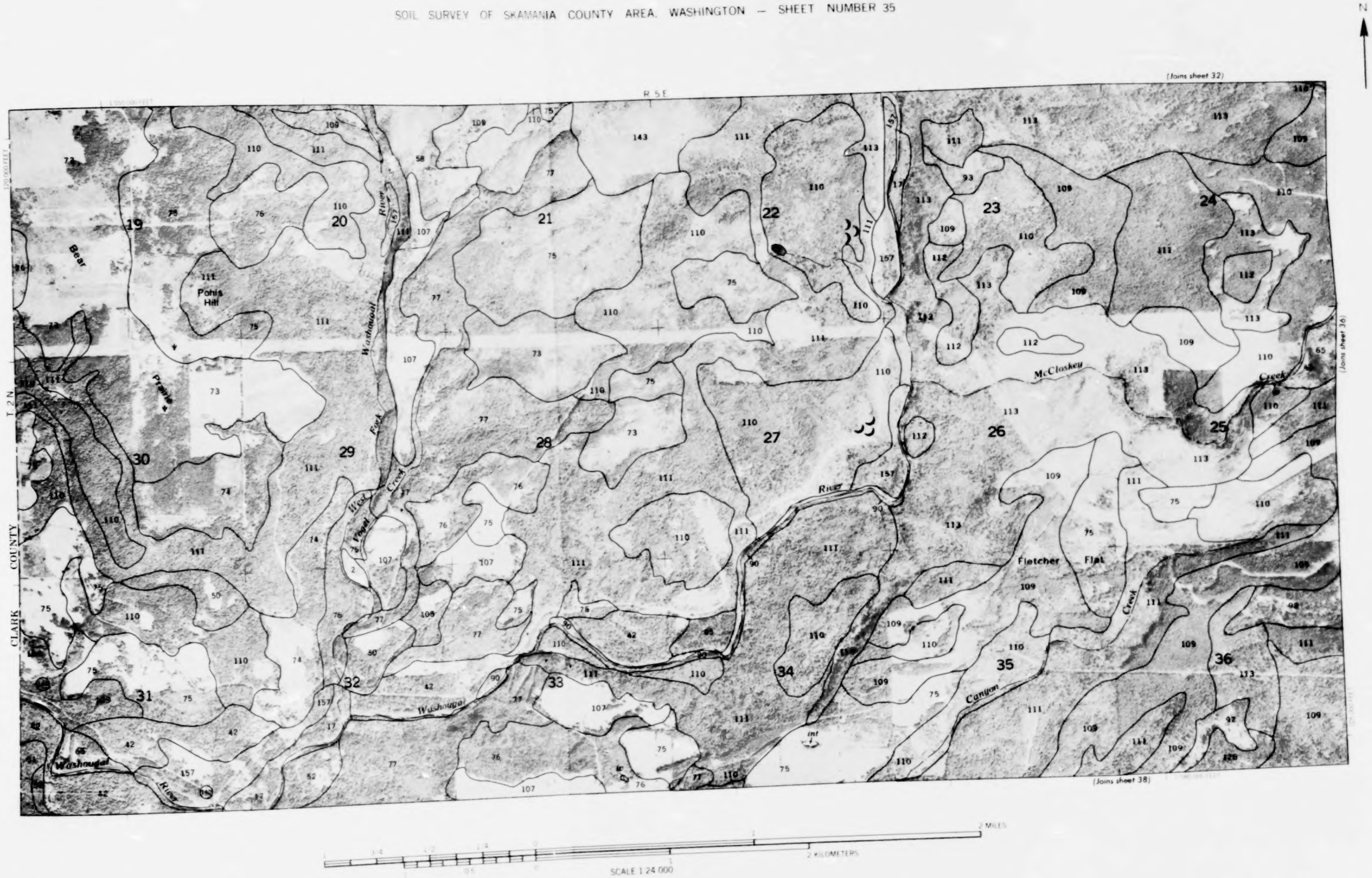
N


R. 6 E.
T. 2 N.
(Joins sheet 27)
(Joins sheet 34)
(Joins sheet 36)
(Joins sheet 32)
Woodward Creek
Hardy Creek
Hamilton Creek
Duncan Creek
McCloskey Cr.
BEACON ROCK STATE PARK
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
2 MILES
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 34


N
(Joins sheet 28)
(Joins sheet 33)
(Joins sheet 37)
(Joins inset A, sheet 18)
R 7 E
T 2 N
Table Mtn.
Greenleaf
Crescent Lake
Mosley Lakes
Iman Lake
Little Iman Lake
Rock Cove
STEVENSON
Bowles Lakes
Blue Lakes
Squaw Lake
Ashes Lake
Little Ashes Lake
COLUMBIA
RIVER
OREGON
BURLINGTON NORTHERN
Hamilton
Creek
BEACON
ROCK
STATE
PARK
Sacagawea and Papoose Rocks
Carpenters Lake
Kidney Lake
Cottail Lake
Bass Lake
Spring Lake
Evergreen Lake
Grass Lake
Walnut Lake
Ice House Lake
Cedar Creek
Aldrich Butte
Sheridan Pt
14
1
2
3
4
5
6
8
9
10
11
14
15
16
17
37
42
87
92
123
124
125
126
128
161
165
166
183
236
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

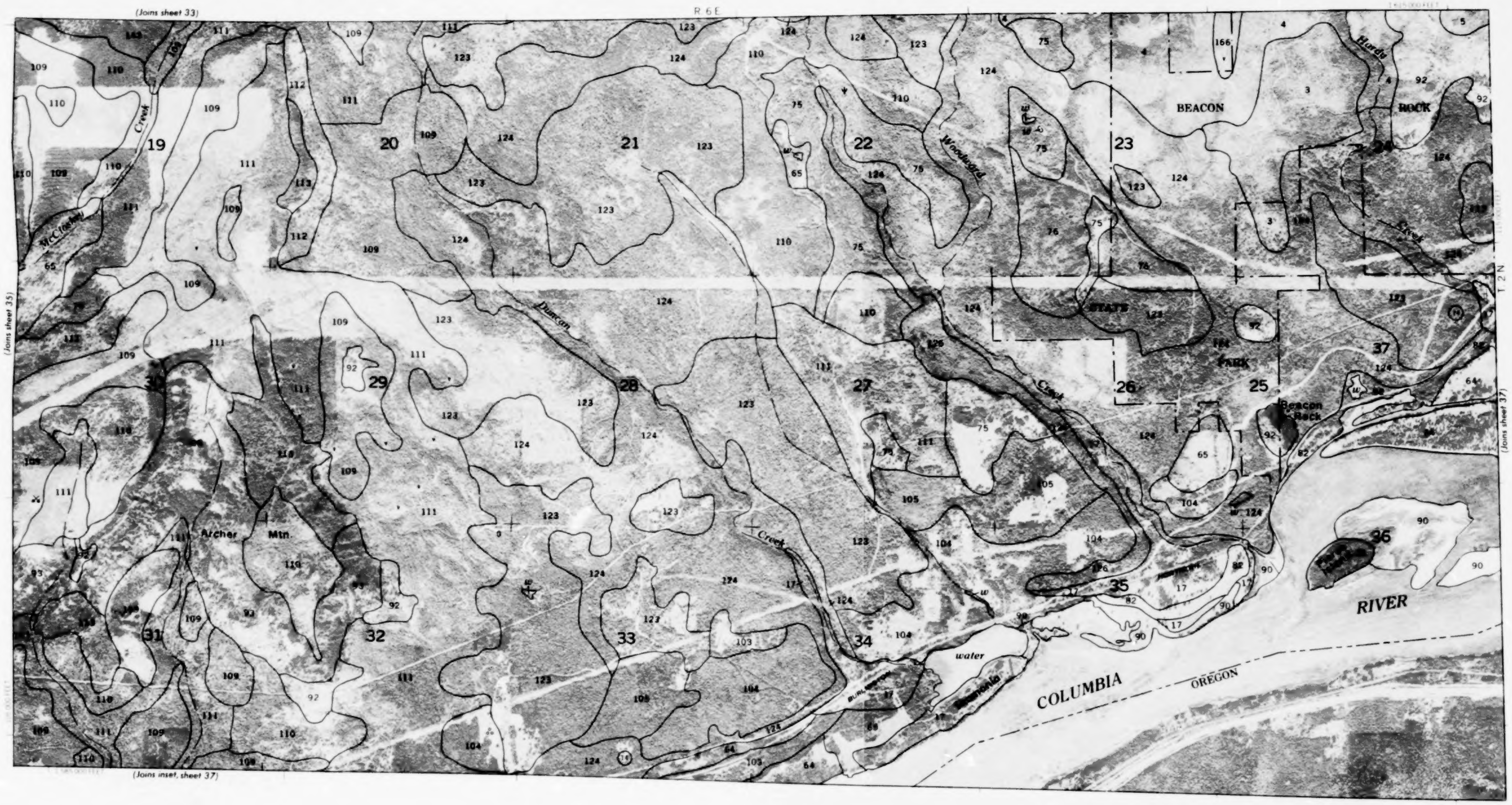
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 35


N
(Joins sheet 32)
R. 5 E.
T. 2 N.
CLARK COUNTY
Bear
Prairie
Pohis Hill
Washougal River
West Fork
Creek
McCloskey Creek
Fletcher Flat
Canyon Creek
Washougal River
(Joins sheet 36)
(Joins sheet 38)
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
2 MILES
2 KILOMETERS
SCALE 1:24 000

36

N

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 36


(Joins sheet 33)
R 6 E
(Joins sheet 35)
(Joins sheet 37)
(Joins inset, sheet 37)
T 2 N
BEACON
ROCK
STATE
PARK
Beacon Rock
Archer
Mtn.
Duncan
Creek
Woodward
Creek
Hardy
Creek
McCloskey
Creek
water
COLUMBIA
RIVER
OREGON
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37

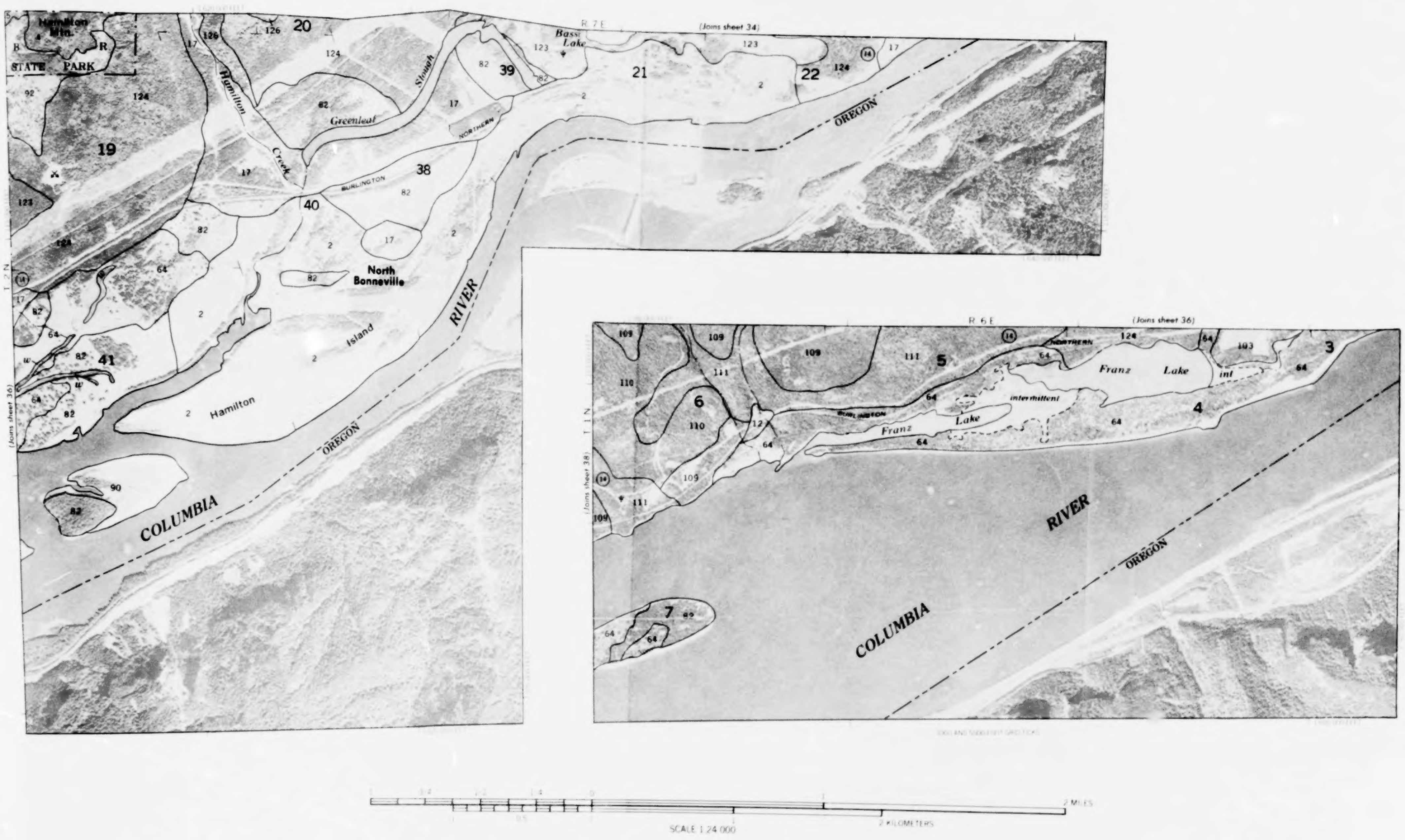
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 37

N



Hamilton Mtn.
STATE PARK
R. 7 E.
(Joins sheet 34)
Bass Lake
Hamilton Creek
Greenleaf Slough
NORTHERN
BURLINGTON
North Bonneville
Hamilton Island
COLUMBIA RIVER
OREGON
T. 2 N.
(Joins sheet 36)
19
20
21
22
38
39
40
41
2
17
64
82
90
92
123
124
126
R. 6 E.
(Joins sheet 36)
T. 1 N.
(Joins sheet 38)
Franz Lake
intermittent
int
3
4
5
6
7
12
103
109
110
111
14
2 MILES
2 KILOMETERS
SCALE 1:24 000

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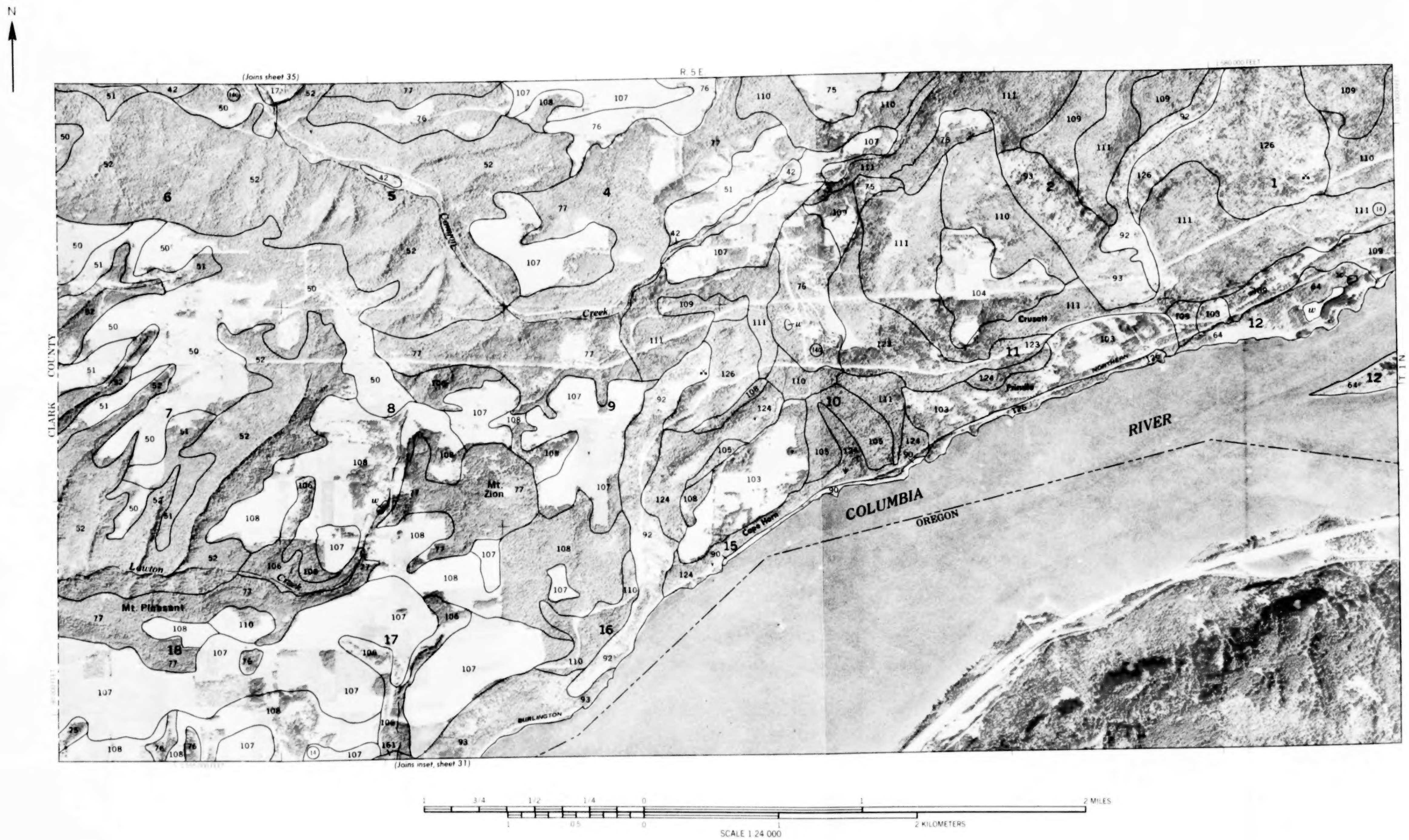
SOIL SURVEY OF SKAMANIA COUNTY AREA, WASHINGTON — SHEET NUMBER 38


N
(Joins sheet 35)
R. 5 E.
1 580 000 FEET
CLARK COUNTY
Mt. Zion
Lawton Creek
Mt. Pleasant
Creek
Gu
Crusatt
Prindle
NORTHERN
Cape Horn
COLUMBIA
RIVER
OREGON
BURLINGTON
T. 1 N.
(Joins inset, sheet 31)
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000